MRC GRAPHITE PTY LTD

MUNGLINUP GRAPHITE PROJECT

S38 & EPBC Assessment: Supporting Information

DOCUMENT NO: MRCG-PRJ-ENV-PER-0001

Munglinup Graphite Project
S38 & EPBC Assessment: Supporting Information

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Executive Summary

The Munglinup Graphite Project (the Project) is located in the South Coast region of Western Australia, approximately 105km west of Esperance, 85km east of Ravensthorpe and 4km north of Munglinup.

The proposed Project will consist of a series of open pits targeting graphite, a processing plant, tailings storage facility, waste rock landforms, and associated supporting infrastructure. The Project is a joint venture between MRC Graphite Pty Ltd (MRC Graphite, the operator), and Gold Terrace Pty Ltd (Gold Terrace). The operations will occur on tenure held jointly by MRCG and Gold Terrace. As part of the Project a section of the existing Reynolds Road will be upgraded as alternative and emergency access route for the Project.

This document provides a summary of the supplementary information supporting the *Environmental Protection Act 1986* s38 and *Environment Protection and Biodiversity Conservation Act 1999* Part 9 assessment; as requested by the WA Environmental Protection Authority (EPA) and the Commonwealth Department of Agriculture, Water and Environment (DAWE).

The Project proposes to clear a maximum footprint of 350ha within a development envelope of 650ha. The majority of proposed disturbance will be new disturbance. Section 2 provides a detailed summary of the Project, including all mining and related infrastructure, Project justification and the alternative options considered.

Stakeholder engagement has been undertaken throughout the exploration and planning stages of this Project. The identification of key stakeholders and stakeholder engagement activities completed to date is described in Section 3.

In support of the Project, a series of baseline studies have been undertaken across the Project area to understand the environmental context, and potential impacts associated with the Project. A summary of the regional information and the findings of baseline studies are provided in Section 4. Copies of the baseline studies undertaken since referral in 2018 are included in APPENDIX C.

From baseline information provided during the referral process, the WA EPA has identified the following key environmental factors for the Project:

- Flora and Vegetation;
- Terrestrial Fauna;
- Inland Waters; and
- Social Surrounds.

Where supplementary information was requested by the WA EPA and DAWE on the above factors, potential impacts and proposed mitigation measures are discussed in detail in Section 5.

Other environmental factors potentially affected by the Project, but not considered as key factors include:

- Short Range Endemic Terrestrial Fauna; and
- Ecological Linkages.

Discussions on these environmental factors including potential impacts and mitigation measures are provided in Section 6.

This document also provides information on Matters of National Environmental Significance (MNES) observed or potentially occurring within the Project area to support an assessment under Part 9 of the *EPBC Act 1999*. The MNES relevant to the Project are:

- a threatened ecological community;
- a listed flora species; and
- four listed fauna species.

A detailed description of these relevant matters, potential impacts associated with the Project and proposed mitigation measures are provided in Section 7.

The development and implementation of the Project will provide an economic benefit to the communities of Munglinup, Esperance and Ravensthorpe by providing jobs and growing the local economy and the broader Western Australian community. The Project also provides Western Australia with its first graphite mine since 1945, when graphite was last mined from the area and the first new graphite mine for Australia since the Ulery graphite mine closed in 1993. The Munglinup graphite resource has been a strategically significant deposit since its discovery in the early 1900's; when the region around the deposit was registered as a mining reserve for the purpose of protecting the resource for future development.

MRC Graphite acknowledges there will be impacts to the surrounding environment despite the small disturbance footprint and, at this stage, short mine life (15 years). The Project has been designed to minimise impacts to flora, fauna, and heritage primarily through extensive consultation and avoidance of known locations of significance as identified in the baseline surveys completed to date. MRC Graphite is committed to ensuring environmental and social impacts are appropriately managed through the life of the mine by adopting appropriate industry practices and impact minimisation strategies.

1 Introduction

1.1 Background

The Munglinup Graphite Project (the Project) is a joint venture between MRC Graphite Pty Ltd (MRC Graphite, the operator, and Gold Terrace Pty Ltd. The Project is located 105km west of Esperance, 85km east of Ravensthorpe and 4km north of the town of Munglinup in the south coast region of Western Australia (Figure 1-1). Access to the Project is currently from the South Coast Highway and the local Mills and Reynolds Roads. The Project is predominantly situated within Mining Reserve R24714 on M74/245, G74/9, L74/55 and L74/56. Graphite within the Project area has been identified, studied, and historically mined by several companies over the last 100 years. The Munglinup Graphite Project has a proposed maximum disturbance footprint of 350ha within a development envelope of 650ha. Past clearing onsite has been limited to historic shafts, exploration pads and drill lines; the majority of 350ha footprint will be new disturbance.

Baseline studies have been completed over the proposed Project area. The environmental factors addressed in this document have been identified by the Western Australian Environmental Protection Authority (EPA) as well as the Commonwealth Department of Agriculture, Water and Environment (DAWE).

Figure 1-1 Location of the Munglinup Graphite Project

1.2 Document Purpose & Scope

This document has been prepared to provide supplementary information request to support the WA *Environmental Protection Act* s38 (*EP Act*) and *Environment Protection and Biodiversity Conservation Act 1999* Part 9 (*EPBC Act*) assessment requested by the EPA and the DAWE post 2018 referral.

In support of the Munglinup Graphite Project assessment, a series of baseline studies were conducted between 2018 and 2020 to address the following key matters requiring additional information:

- Matters of National Environmental Significance (MNES);
- Flora and Vegetation;
- Terrestrial Fauna; and

- Inland Waters.

Studies were also undertaken on the following factors and are summarised in this document:

- Short Range Endemics; and
- Social Surrounds.

1.3 Proponent Information

The Project is a joint venture between MRC Graphite and Gold Terrace. MRC Graphite is a wholly owned subsidiary of Mineral Commodities Ltd. The company details are provided below.

Owner / Operator:	MRC Graphite Pty Ltd
Physical Address:	39-43 Murray Road North, Welshpool WA 6106, Australia
Postal Address:	PO Box 635 Welshpool DC WA 6986, Australia

The key proponent contact for the project is:

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1.4 Tenure

MRC Graphite and Gold Terrace are the tenement holders for tenure associated with the Munglinup Graphite Project. The entire Project is located within Mining Reserve R24714. Native Title has been extinguished within the Mining Reserve. The tenements associated with the Project, granted under the *Mining Act 1978* (WA), are listed in Table 1-1 and shown in Figure 2-1. The proposal also covers the upgrade to the existing Reynolds Road reserve which will be undertaken by the Shire of Esperance with support from MRC Graphite and the addition of an Eastern access track to be located on L74/55.

Table 1-1 Munglinup Graphite Project Tenure

Tenement	Area	Holder	Granted	Expiry
M74/245	685.0ha	MRC Graphite Pty Ltd Gold Terrace Pty Ltd	26/08/2010	25/08/2031
G74/9	26.3ha	MRC Graphite Pty Ltd	11/07/2019	10/07/2040
L74/55	129.2ha	MRC Graphite Pty Ltd	11/07/2019	10/07/2040
L74/56	21.2ha	MRC Graphite Pty Ltd	-	-

1.5 Regulatory Framework & Approvals

The *EP Act* provides the legal framework in Western Australia for the prevention (and control of) pollution and environmental harm, and for the conservation, management, and preservation of the environment. The activities relating to the Project have the potential to impact on environmental factors considered by the EPA and accordingly this information has been prepared.

The *EPBC Act* provides the national legal framework to protect and manage MNES. Under the *EPBC Act* actions that have, or are likely to have, a significant impact on MNES require approval from the Commonwealth Minister for the Environment. The proposal is likely to have an impact on the following MNES, therefore requiring additional information be provided to the Department:

- *Proteaceae Dominated Kwongkan Shrublands of the South Coastal Floristic Province of Western Australia* (Kwongkan Shrublands TEC);
- Four Threatened Fauna species (Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Baudin's Cockatoo (*Calyptorhynchus baudinii*), Malleefowl (*Leipoa ocellata*), and Chuditch (*Dasyurus geoffroii*); and
- One Threatened Flora species (a Sedge, *Conostylis lepidospermoides*).

In addition to referral under the *EP Act* and the *EPBC Act*, the proposed Project will also require the following licences and approvals as outlined in Table 1-2.

Table 1-2 Licences and Approvals Required for the Project

Proposal Activities	Type of Approval (Status)	Legislation
Disturbance of Aboriginal Heritage Sites	Section 18 Approval to interfere with Aboriginal Heritage Site (obtained)	*Aboriginal Heritage Act 1972 (WA)*
Clearing of MNES	Controlled Action	*Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
Disturbance of Rare Flora	Consent to Take Rare Flora	*Biodiversity Conservation Act 2016 (WA)*
Clearing of Native Vegetation	S38 / Ministerial Statement	*Environmental Protection Act 1986 (WA)*
Interference to watercourses	Bed and Banks Permit	*Rights in Water and Irrigation Act 1914*
Prescribed Premises Activities (e.g. processing, disposal of waste, tailings disposal, sewerage disposal).	Works Approval and Licence	*Environmental Protection Act 1986 (WA)*
Construction and Mining Operations	Mining Act Tenure	*Mining Act 1978 (WA)*
Mining and associated activities (e.g. processing, waste stockpiling, tailings storage)	Mining Proposal and Mine Closure Plan	*Mining Act 1978 (WA)*
Construction and Mining Operations	Project Management Plan	*Mines Safety and Inspection Act 1994 (WA)*
Storage and Handling of Dangerous Goods	Dangerous Goods Licence	*Dangerous Goods Safety Act 2004 (WA)*
Construct/install Sewage treatment/handling tanks	Approval to Construct or Install Apparatus for the Treatment of Sewage.	*Health Act 1911 (WA)*
Buildings	Building Licences	*Local Government Act 1995 (WA)*

2 The Proposal / Project Description

2.1 Mining History

The Munglinup graphite deposits have been held and explored by several companies, prospectors and groups over the last 100 years. The first exploration shafts were constructed before 1917 and mining records indicate that a small amount of graphite was extracted during the 1920's and likely used as part of the First World War effort. The small, shallow prospecting shafts which were created at that time are located over the known ore zones.

Since the 1970's several exploration companies have investigated the viability of the graphite deposits including Metals Exploration NL (1971-1972), Norseman Gold Mines (1979-1980), Pioneer Concrete (1985-1986) and Gwalia Minerals NL (1988-1997) (MRC Graphite, 2018c). In 1989 Gwalia Minerals NL (Gwalia) declared a measured and indicated resource of 1,467,500 tonnes at 18.2% which was estimated in accordance with the AusIMM's 1989 JORC Guidelines. A feasibility study was produced in 1991 and a Notice of Intent (NOI) was submitted for the development of an open pit mine (MRC Graphite, 2018c). In 1997, Gwalia released a statement that the Munglinup Graphite Project would not be brought into production until a proportion of the graphite output had been contracted for sale. In 2004 Gwalia went into administration and then receivership (MRC Graphite, 2018c).

In 2007, Adelaide Prospecting Pty Ltd acquired the Munglinup Graphite Project from the administrator of Gwalia Minerals NL. In 2009 the Project was then sold to Graphite Australia Pty Ltd. Exploration activities and metallurgical work was completed by Graphite Australia from 2011 to 2013 (Mineral Commodities Ltd, 2017). In 2014, Gold Terrace Pty Ltd acquired the tenure associated with the Munglinup Graphite Deposits when Graphite Australia went into receivership. In November 2017, MRC Graphite entered into a joint venture agreement with Gold Terrace.

2.2 Proposal Description

Access to the Project is currently from the South Coast Highway and the local Mills and Reynolds Roads however access during operations is planned to occur via Farmers and Clayhole Roads. The Project is situated within Mining Reserve R24714 on M74/245, G74/9, L74/55 and L74/56.

The proposed Project will consist of a series of open pits targeting graphite, a processing plant, tailings storage facility, waste rock landforms, and associated supporting infrastructure.

The key characteristics of the Project are summarised in Table 2-1 and presented in Figure 2-1 and Figure 2-2.

Table 2-1 Key Characteristics of the Munglinup Graphite Project

Proposal Title	Munglinup Graphite Project
Proponent Name	MRC Graphite Pty Ltd
Short Description	The Project is located within the South Coast region of Western Australia 4km north of the town of Munglinup along the South Coast Highway. The closest regional township is Esperance located 105km to the east. The Munglinup Graphite Project includes the development of graphite deposits as series of open pit mines with a total footprint of 63ha. Associated infrastructure including waste rock landforms, tailings storage facility, processing plant and run-of-mine/ low-grade stockpiles, workshops, administration buildings power generation and roads (haul and LV) are proposed.

Element	Location	Proposed Extent
Physical Element		
Open Pits	Figure 2-2 M74/245	Disturbance of up to 63ha within a 650ha development envelope. Graphite deposits to be mined as open pit mines. Depth ranging from 50 – 120m.
Waste Rock Landform (WRL)	Figure 2-2 M74/245	Disturbance of up to 120ha within a 650ha development envelope. Up to five waste rock landforms are proposed including a waste rock buttress on the downstream side of the TSF wall.
Tailings Storage Facility (TSF)	Figure 2-2 M74/245 G74/9	Disturbance of up to 86ha within a 650ha development envelope. Centreline tailings storage facility for thickened tailings. Maximum final height of the TSF 15m.
Processing Plant	Figure 2-2 M74/245	Disturbance of 1ha within a 650ha development envelope. Ore will be scrubbed, followed by grinding, with graphite recovered by flotation.
Supporting Infrastructure	Figure 2-2 L74/55 L75/56 Reynolds Rd Reserve	Disturbance of 10ha within a 650ha development envelope. Other supporting infrastructure includes administration buildings, mine operations buildings, workshops, fuel storage, water storage, pipelines, landfill, borrow pits, power generation, solar field.
Haul and Access Roads	Figure 2-2	Disturbance of up to 40ha within a 650ha development envelope. An access road will be constructed within L74/55 which will be used as the primary site access. A secondary emergency access road will be established by upgrading the existing Reynolds Road within L74/56.
Operational Element		
Ore Processing	Figure 2-2	Processing between 400-500kt per annum of ore.
Graphite Product		Peak of 80 – 85kt of graphite per year.
Water Abstraction	Figure 2-2	Project water requirement of 0.5GL/annum or up to 16.5L/second.
Process Tailings	Figure 2-2	Disposal of up to 500kt per annum in a lined facility.

2.2.1 Disturbance footprint

The Project has a maximum disturbance footprint of up to 350ha. This disturbance footprint is wholly contained within the development envelope of 650ha. A breakdown of the current anticipated disturbance footprint associated with the Project is provided in Table 2-2 and presented in Figure 2-2. The site layout has not been finalised and this disturbance footprint represents the current known maximum extent of ground disturbance. The site layout is likely to change as designs are finalised. It is anticipated that a maximum disturbance footprint would be 350ha. The final disturbance footprint is likely to be smaller than this.

Table 2-2 Maximum Disturbance Footprint

Element	Footprint (ha)
Open Pits	63
Waste Rock Landforms	120
Tailings Storage Facility	86
Supporting Infrastructure – Processing Plant, Administration, Workshops, Water Storage, Solar field	11
Haul Roads/ Access Roads	40
Topsoil & Vegetation Stockpiles	30
Total	**350**

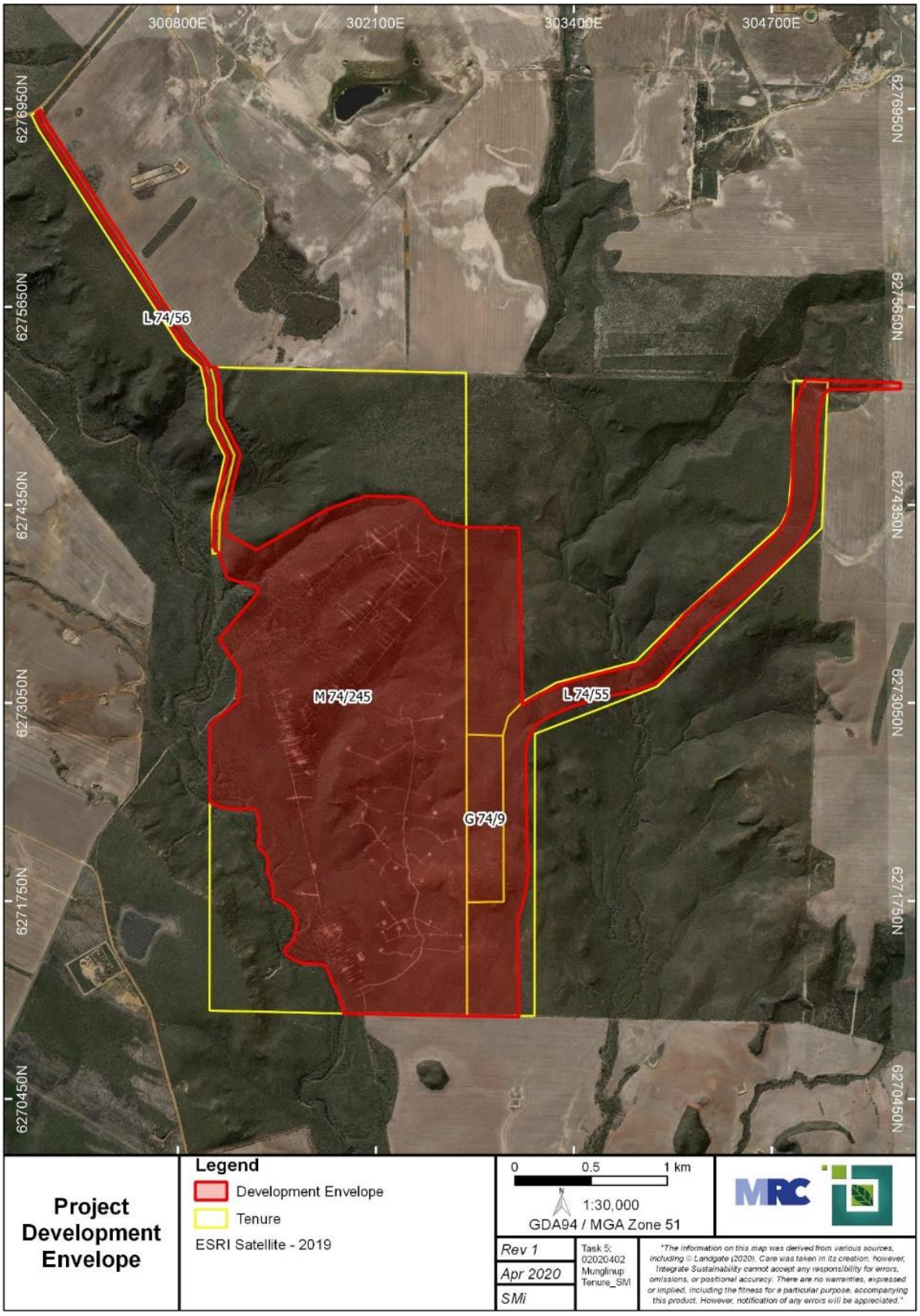


Figure 2-1 Project Development Envelope

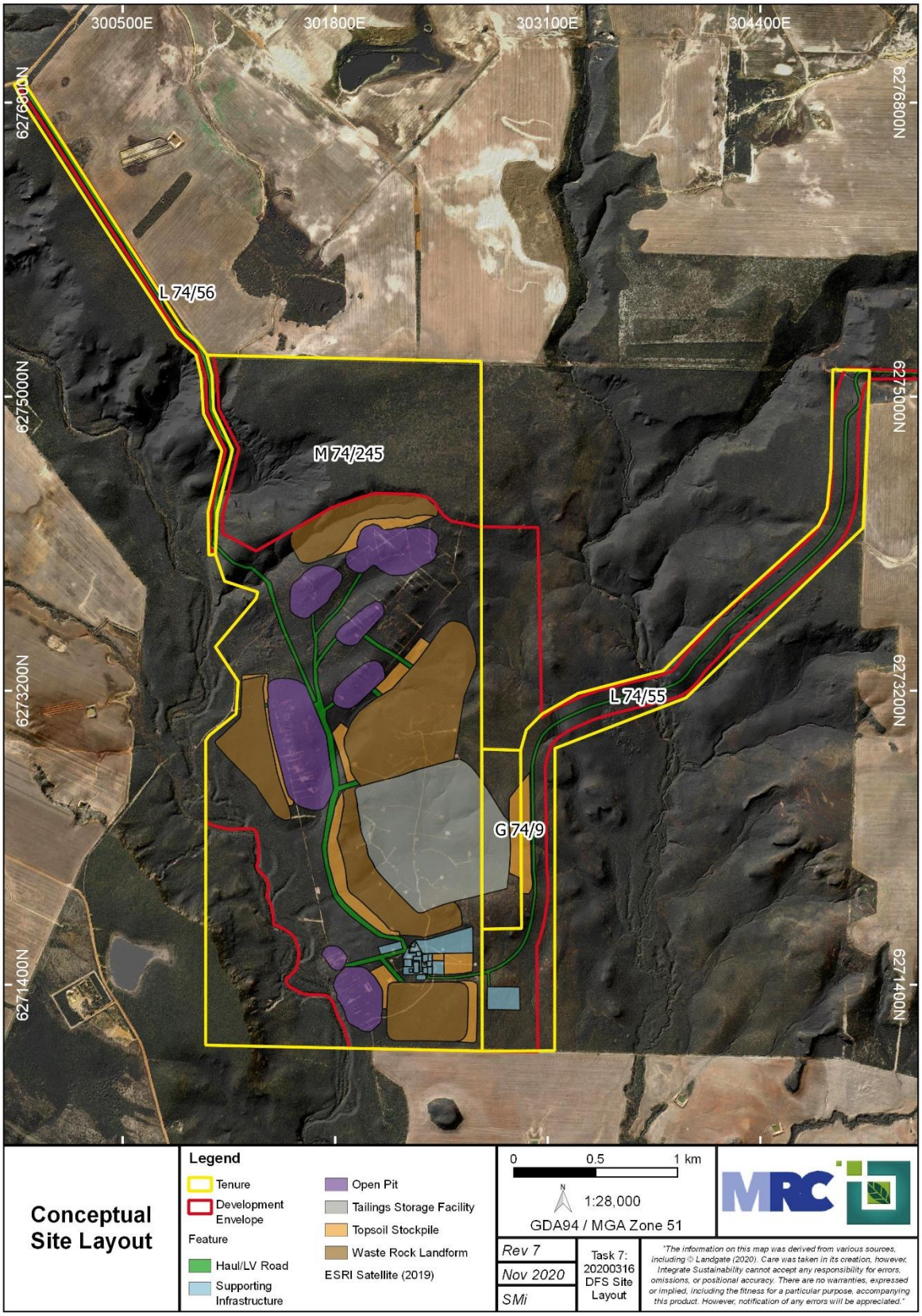


Figure 2-2 Conceptual Site Layout

2.2.2 Mining

The graphite deposits are proposed to be mined via open cut methods. A series of open pit will be mined over the 10-15-year mine life. It is envisaged that several open cut pits will be in operation concurrently. Approximately 2.5 million tonnes of material will be mined per annum.

The open pits will be mined using 40 to 90 tonne class excavators and 45 tonne articulated dump trucks. All pits will be mined by 'free dig' however, some drill and blast activities may be required for some of the larger pits at depth. Each of the open pits will have similar design parameters with the west wall (footwall), which includes the haul ramp, having slope angles of 36° overall and the east wall with a slope angle of 45° overall (MRC Graphite, 2018c). Ore from each of the open pits will be transported to a run-of-mine (ROM) pad located to the south-east on M74/245. Ore will then be processed through the adjacent processing facility.

MRC Graphite envisage that development and production from the open pits will commence at Halberts Main pit in 2021.

A summary of the characteristics of each open pit is provided in Table 2-3.

Table 2-3 Key Characteristics of Open Pits

Open Pit	Mine Life	Depth (m)	Dimensions (m)
Halberts Main	~7 Years	120	805m x 275m
Halberts South	~4 Years	100	340m x 220m
Harris	~2 Years	40	440m x 160m
McCarthy East	~1 Year	32	375m x 100m
McCarthy West	~3 Years	53	320m x 220m
Whites	~5 Years	120	380m x 285m

2.2.3 Waste Rock Landforms

Waste rock landforms (WRLs) will be constructed to contain waste rock generated during mining. Construction will be a 'bottom-up' sequence where each dump flitch will be formed by securing the toe of the site and forming a tip head from which rock will be truck dumped (MRC Graphite, 2018c). Preliminary investigations suggest up to five waste rock landforms will be constructed to contain 19Mm^3 of waste rock. A landfill will likely be incorporated into at least one of the WRLs to allow for the disposal of putrescible waste generated onsite. The indicative location of the WRLs is shown in Figure 2-2 and a summary of the key characteristics provided in Table 2-4.

Table 2-4 Key Characteristics of the Waste Rock Landforms

Parameter	Waste Rock Landforms
Number	5
Total Volume	19Mm^3
Maximum Height	30m
Overall Slope Angle	15 degrees
Slope Design	Concave
Total Area	120ha

2.2.4 Ore Processing

Ore from the open pits will be transported to the ROM Pad where it will be stockpiled and processed through the processing plant. The processing plant is designed to treat up to 500ktpa of ore. Ore will be scrubbed, followed by grinding, with graphite recovered by flotation. The ore processing will include inter-stage polishing re-grind milling of flotation cleaners' concentrates to improve liberation and thus product purity, whilst protecting the size of the graphite flakes. The flotation concentrate is then dewatered, dried and bagged.

The indicative process flowsheet is provided in Figure 2-3 and the conceptual processing plant layout is presented in Figure 2-4. (MRC Graphite, 2018c). The process is described in more detail below.

Table 2-5 Processing Design Criteria Summary

Criteria	Description
Plant Capacity	Up to 500ktpa
Head Grade – Design	17% TGC
ROM Ore top size	500mm
Design Graphite Recovery	85%
Product Grade Target	>94% TGC
Concentrate Product	60,000 tpa
ROM Feed Rate (Nominal)	50 dry tph

ROM ore will be processed through a primary crusher, stockpiled, and then reclaimed to feed a scrubber. The ore types are understood to be variable in their degree of weathering, clay content and competency. A mineral sizer has been selected as the primary crusher as this unit is capable of treating sticky clays as well as moderately competent material. Primary crushing is required to reduce the top size entering the scrubbing circuit. Stockpiling of primary crushed ore provides a buffer to allow controlled feed rate to the scrubber as well as an additional opportunity for blending on the stockpile.

Scrubber discharge is screened, and the oversize (+1mm) screen product will be conveyed to feed a ball mill. Ball mill discharge slurry is pumped back to the scrubber screen feed. Screen undersize (-1mm) will be pumped to flotation. Scrubber screen deck oversize material can be routed to a bunker rather than to the mill if the ore becomes more competent or production from the primary mill is bottlenecked. The feature provides operational flexibility.

The flotation circuit consists of a single rougher bank and five stages of conventional cleaning prior to final cleaning in a Jameson cell. Inter-stage concentrate regrinding is installed between each cleaning stage to improve liberation and product grade.

De-sliming of flotation feed may be used in graphite flotation circuits. Typically, a cyclone is used but product loss through cyclones is prevalent because of the graphite flake shape factor. The circuit does not include a de-sliming step. This also reduces cost and complexity of the circuit. Instead the rougher flotation bank has been generously sized to allow extra residence time to mitigate for the presence of slimes.

A coarse concentrate product can be screened out in the later stages of the cleaner flotation circuit to avoid overgrinding of the coarse fraction and devaluing the product. The +150µm coarse product fraction can be recovered by sending either one of the third, fourth or fifth cleaning stage feed streams to a screen. The selection of the stream to be screened is made by operator judgment if it is found that enough coarse graphite with acceptable graphite purity is present to make it worthwhile.

Stirred mills for regrinding of each cleaner stage concentrate have been selected to minimise graphite flake breakage during re-regrind.

A Jameson Cell has been selected for the last stage of cleaning to minimise the entrainment of fine gangue material in the concentrate.

Flotation concentrate from the coarse graphite screen and the Jameson Cell cleaner stage gravitate via a 1mm aperture trash screen to a filter feed storage tank. The concentrate slurry is then filtered. If required, the filter cake may be washed with low salinity water to improve product quality. The filter cake is conveyed to a thermal dryer. The drier product is screened into five products (jumbo, large, medium, small and powder) based on the particle size fractions and packed into one-tonne bags using an on-site bagging facility.

The processing plant and ROM will operate on a 24-hour basis. The components of the processing plant will be confined within sheds to reduce noise and light emissions.

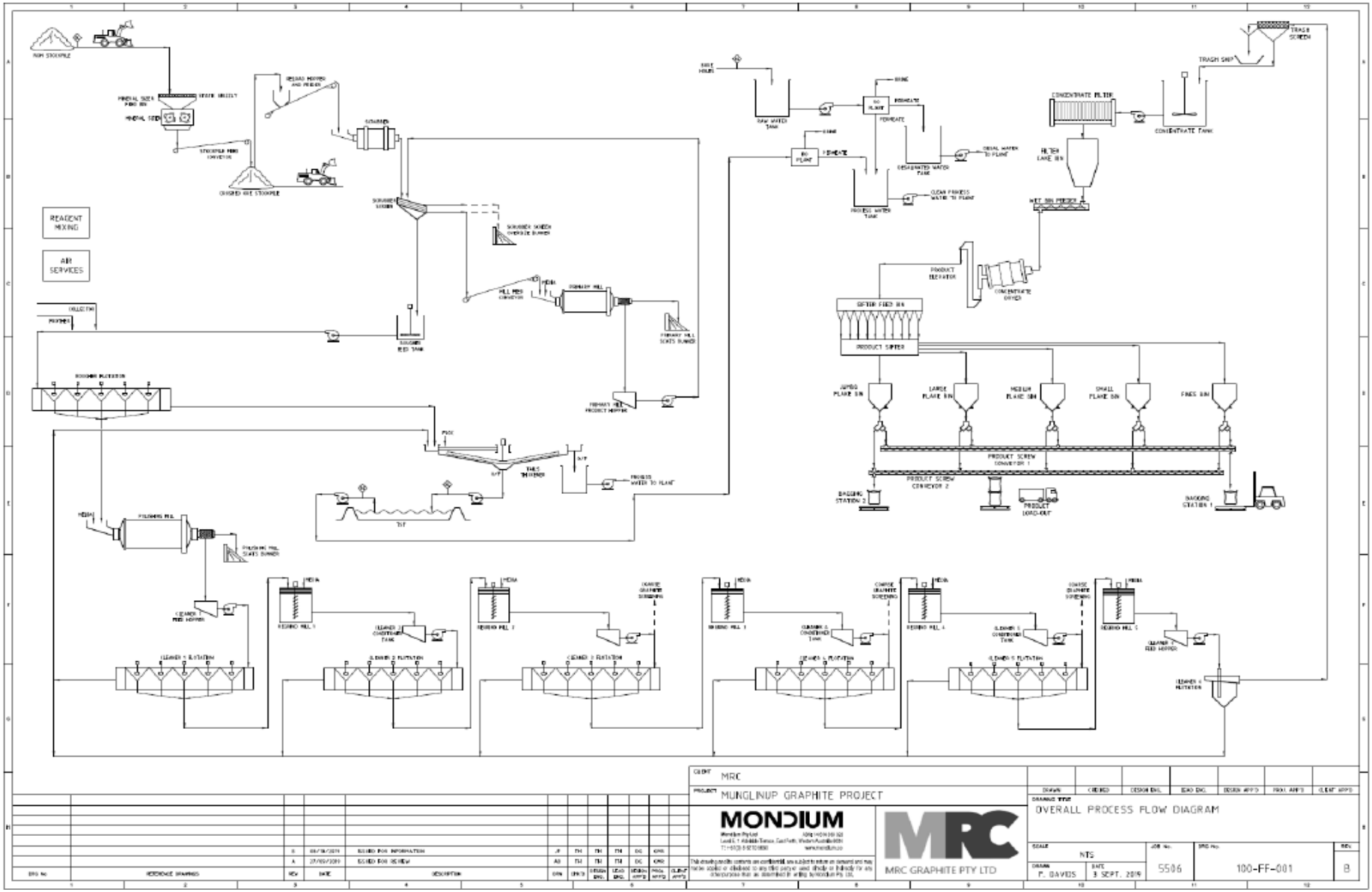


Figure 2-3 Indicative Processing Flowsheet

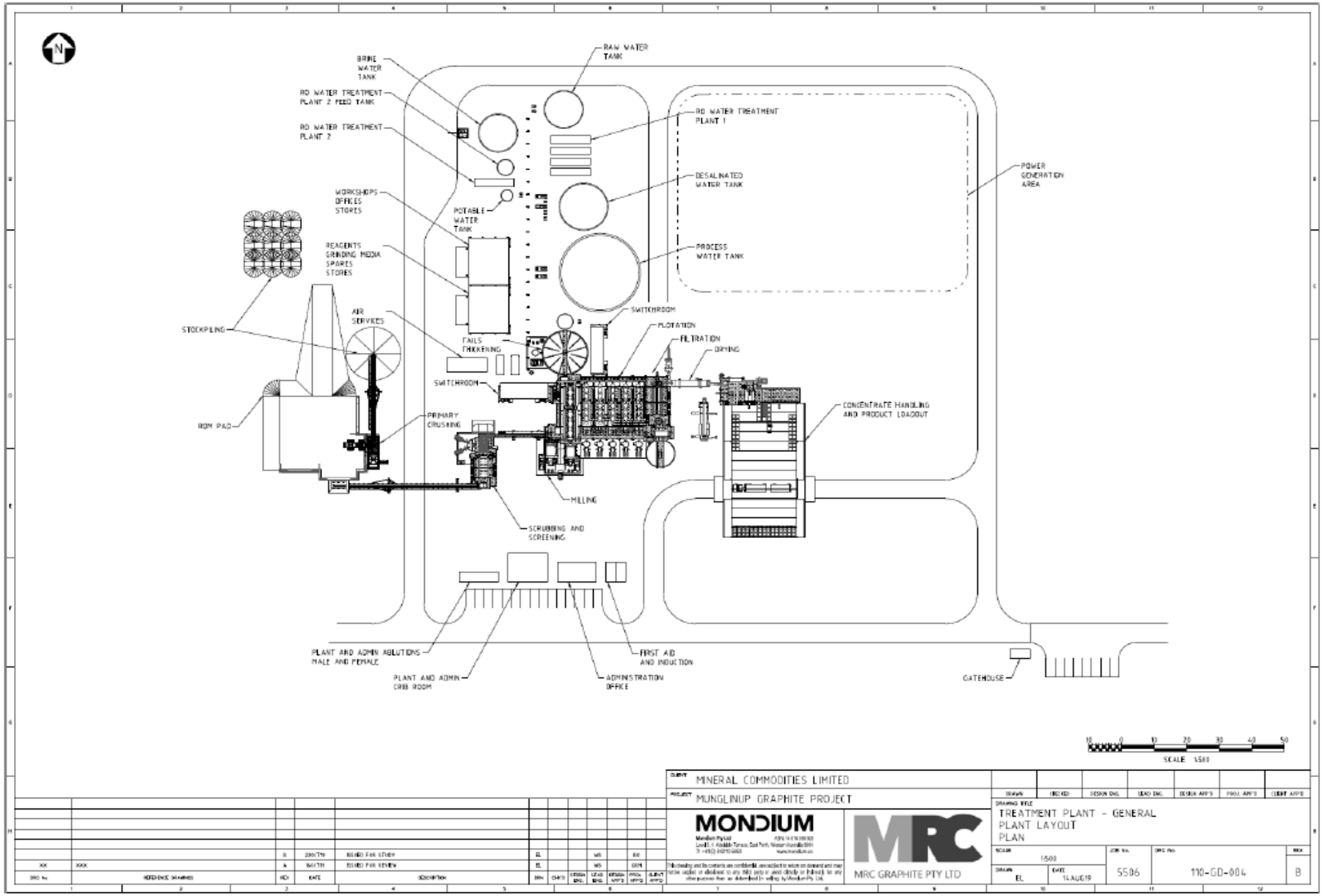


Figure 2-4 Conceptual Processing Plant Layout

2.2.5 Tailings Storage Facility

Klohn Crippen Berger (KCB) is engaged to undertake a concept design and opinion study for the tailings storage facility (TSF). In selecting a suitable location for the TSF, MRC Graphite and KCB have taken into consideration the location of ore bodies, planned infrastructure, tenure boundaries and issues of conservation significance (KCB, 2018). The TSF site is located in the south-east of M74/245 between two ridges where the natural topography dips in a south-west direction (KCB, 2018). The natural ground level ranges between RL 88m in the south-western corner and RL 102m along the northern and southern ridges (KCB, 2018). The TSF will utilise the two ridges to reduce total embankment fill requirements (KCB, 2018).

Tailings will be thickened and pumped to a conventional paddock type TSF. The TSF will require storage of approximately 5.64Mt of non-acid forming tailings produced at a rate of 0.35Mtpa for a design life of 14 years.

Based upon a proposed location within a natural saddle feature, an initial TSF options assessment for an above ground TSF was undertaken. From this assessment, a centreline-raised, single-cell TSF located north of the process plant was selected for development (Figure 2-5). The centreline construction method minimises the reliance on the deposited tailings for strength and stability of the perimeter embankment, whilst utilising the mine waste material for construction of future raises.

The starter embankment (Stage 1) will be constructed to a crest elevation of RL 90m. The TSF will then be progressively raised (nominally bi-annually) to crest elevations of RL 93m, RL 96m, RL 99m, RL102m and RL 104m. Figure 2-6 shows the cross section and progressive crest elevations. The starter embankment (Stage 1) will be constructed of compacted low permeability fill material sourced from the pit pre-strip operations and impoundment excavation works. Subsequent raises will be constructed of low permeability fill on the upstream section of the embankment, with mine waste material being utilised in the downstream zone of the embankment.

The TSF site will progressively fill the natural saddle feature over the life of the Project, upon closure, the tailings surface will be at a level such that there is a low embankment (1m to 2m above existing ground level) on the North Eastern corner of the facility and an embankment of approximately 24m level in the south-western corner.

The tailings will be pumped to the TSF as a slurry at a target solids concentration of 45% solids by mass. Deposition into the TSF will take place through spigots located along the perimeter embankments. A floating pontoon will be implemented throughout the life of facility as it is anticipated that there will not be a “centrally located” pond for many years into the life of the facility. Supernatant water will be returned to a return water pond in the processing plant area for reuse.

The stability analysis of the Munglinup Graphite TSF embankment was carried out using the 2D limit equilibrium slope stability analysis software SlopeW. Models were constructed for sections through both the South Western corner and Western embankments. Two representative cross-sections were analysed using the Morgenstern-Price method. The results of the stability analyses indicate that the estimated Factor of Safety against failure is greater than the Australian National Committee on Large Dams (ANCOLD, 2012) recommended minimum values.

A two-dimensional (2D) numerical groundwater flow modelling was performed to assess groundwater flow paths and the resulting pore water pressure distribution. The finite element modelling package SEEP/W (GeoStudio 2018) was used to develop two sections through the South Western and Western Embankments. The average seepage flow rate from the TSF during normal operating conditions, assuming a pond size of 15%, will be less than 1.0 l/s.

A simplified dam break flow path assessment and hazard categorizing was carried out for the TSF. The TSF is classified as a Category 1 dam according to DMIRS (DMIRS, 2013). This classification is based on a High C hazard rating as defined in ANCOLD and an embankment height greater than 15m. The TSF will be constructed under the supervision of a geotechnically competent person and annual audit inspections will also be undertaken by a competent person to ensure the long turn integrity of the facility.

Surface water will be directed away from the facility via excavated drains and bunds into existing drainage channels.

The closure model of the TSF will incorporate a capped facility which will slope from East to West. The TSF will blend into the landscape and will be revegetated.

Diesel will be used as the dominant processing reagent within the processing plant as a collector for graphite flotation. As hydrocarbons will be present within the tailing's material, which is discharged to the TSF, the TSF will be lined appropriately.

Material Characterisation assessment determined that the tailings are non-acid forming, contain 26-46% clay minerals, detected low levels of Molybdenum and Selenium, and contained hydrocarbon consistent with diesel, the main processing reagent. The work undertake thus far suggest that the Munglinup tailings present a low risk to surface and groundwater quality; the latter exhibits salinity from 20,000 to 26,000 mg/L TDS, compared with a generally recommended maximum of 1,000 mg/L for drinking water.

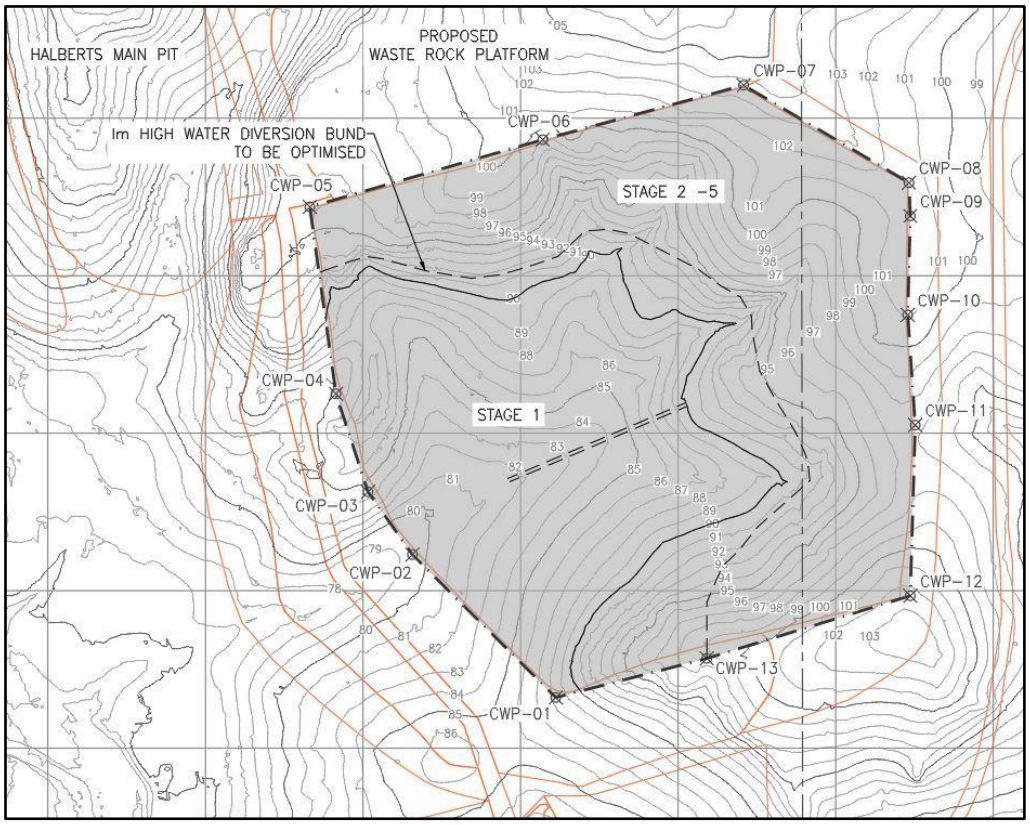


Figure 2-5 Preliminary TSF Design Stage 1-5

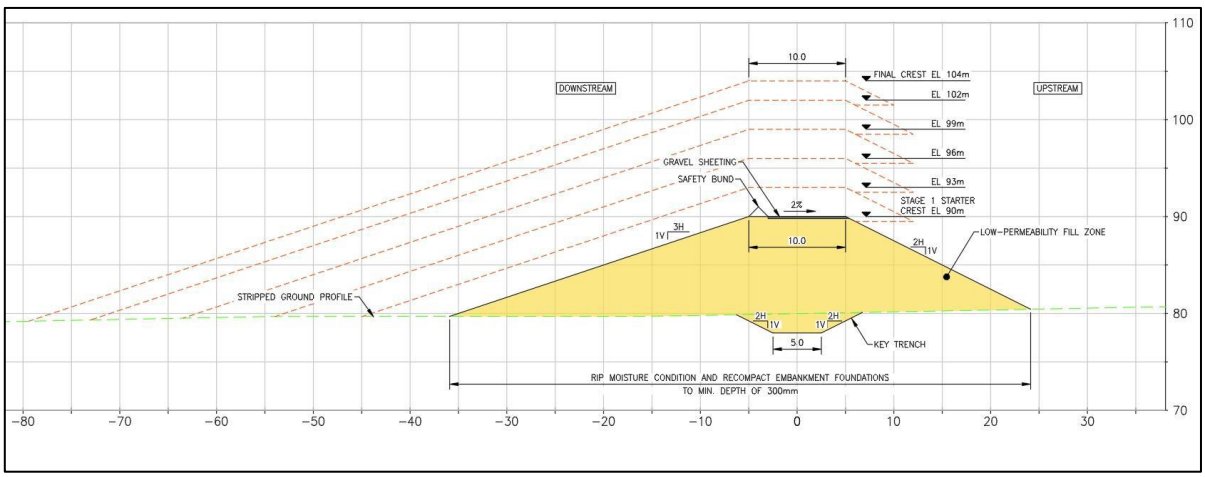


Figure 2-6 Tailing Wall Cross Section

2.2.6 Support Facilities

There are no existing buildings, structures or facilities on site relating to the Project, hence these support facilities will need to be constructed.

2.2.6.1 Offices / Workshops

A number of buildings will be required to provide support and management of the Munglinup Graphite Project during construction and operation. These facilities will include:

- Site administration offices;
- Crib and ablution blocks;
- Warehouses and workshops;
- Control rooms;
- Laboratory; and
- Process Plant shelter buildings.

Buildings will generally be of the modular (transportable) prefabricated type, including some dome-shelter type buildings with steel-framed constructions where necessary (MRC Graphite, 2018c).

2.2.6.2 Power Supply

The power requirements for the main process plant have been calculated at a total connected load of 5.3MW including all duty and standby equipment with an estimated average demand of the Project being 2.5MW with a peak of 2.8MW. The onsite power supply will be provided by either liquefied natural gas (LNG) and/or diesel. Onsite fuel storage for LNG power supply will be sufficient for 10-11 days operational requirements, while diesel fuel onsite storage will be sufficient for 7 days of operation. It is likely that power supply will be provided across the operation via overhead powerlines placed adjacent to haul or LV roads.

MRC Graphite is undertaking investigations into the feasibility of a diesel solar hybrid alternative power solution. If this pathway is progressed, the solar field would be located to the south-east of the processing plant and accessed via a LV road.

2.2.6.3 Water Supply

The Munglinup Graphite Project will require approximately 0.5GL per annum or up to 15.6L per second. This is anticipated to be generated from a combination of pit dewatering and onsite supply bores. Water recovered from bores will not be required once tailings return (decant) water is available. Depending largely upon net evaporation rates (evaporation minus rainfall), indicated decant return is expected to range from 0 to 10L/s.

The water balance (Table 2-6) does not include surface water that would accumulate in mine pits following rainfall or surface runoff directed into sediment pits, rather than being allowed to flow into the Munglinup River.

Water demand at the processing plant is estimated to average 1m^3/t mill feed. The Project is located within a zone where groundwater salinity is shown to be in a range from 19,000 to 27,600mg/L TDS, (except for 4,400mg/L at bore NPB01); neutral to alkaline (pH 6.6 to 7.6), and of a sodium chloride type with elevated magnesium and sulphate. Metal concentrations were generally low or below reporting levels except iron (up to 6.5mg/L) and manganese (up to 10.1mg/L). Nutrients (nitrogen and phosphorus) were at low concentrations. (Rockwater, 2018b).

The results of test-pumping suggest that individual pumping capacities of the seven bores recommended for equipping could total 1,760m^3/d initially. However, the pumping capacity will be reduced by drawdown interference overtime (Rockwater, 2020b)

A numerical groundwater model was constructed to estimate duty pumping rates for bores; pumping rates required for pit dewatering; water availability from the bores for the mine water supply; water-level recovery following mining; and the nature of final mine voids. The model estimated peak pumping rates from the seven production bores in conjunction with the generally minor additional pumpage required from in-pit pumps to dewater the pits. The modelling results indicate that the seven

bores might be able to produce about 1,330m^3/d (15.4L/s) in total pumping continuously over the first year, and lower rates subsequently (Rockwater, 2020b).

Table 2-6 Mine Site Water Balance (Rockwater, 2020b)

Activity	Avg. Demand (L/s) (With TSF Return Water)	Avg. Demand (L/s) (without TSF Return Water)
Bore-water to RO Plant	3.61	13.33
RO Water Produced	2.89	10.7
Brine Produced	0.72	2.7
Plant Water Required	2.7	9.92
Potable Water Required	0.2	0.2
TSF Return Water	7.22	0
Dust Suppression Water	3.5-5	3.5-5
Additional Water for Dust Suppression	2.8-3.6	0.8-2.3
Total New (Bore) Water Required	**6.4-7.2**	**14.1-15.6**

2.2.6.4 Dewatering

Dewatering will be required from some of the open pits and the water derived from the pits will be used on-site for activities, such as in the processing plant and for dust suppression, with any excess water stored in an evaporation pond. Based on the groundwater assessment completed by Rockwater (Rockwater, 2020b) pumping from the bores will largely dewater the pits, and the pumping capacity of the bores will gradually decrease during the life of the mine due to interference and drawdown effects.

2.2.6.5 Access and Haul Roads

MRC Graphite propose to construct a new access road from the east which will commence from the existing Clayhole Road. The new access road will be located on L74/55 and enter M74/245 in the south east within the vicinity of the processing plant. Consultation is underway to determine the final route of this access road.

Current access to the Project is via an existing gravel track from the north-west of M74/245 via the gazetted Reynolds Road. As part of this Proposal, MRC Graphite with the Shire of Esperance intend to widen the section of Reynolds Road which extends between M74/245 and Mills Road. Widening this road will allow for an alternative emergency access during operations and the main access into the site during the early stages of construction.

Site access is proposed via the South Coast highway;

- North on Farmer Rd - 8.8km;
- West on Clayhole Rd - 3.6km;
- Primary site access eastern road – 6km; and
- Secondary site access western road.

The new site access roads will be constructed in accordance with appropriate Restricted Access Vehicle (RAV) requirements. In addition, the both Farmer and Clayhole roads will be upgraded as required to compile with RAV road standards.

2.2.7 Logistics and Product Transport

Graphite produced by the Project will be transported by road to the Port of Fremantle (approximately 610km) via a third-party logistics. Product will be loaded into bulka-bags with a nominal weight of one tonne prior to transport via tautliner trailers. Approximate product weight per trip is 60-65 metric tonnes.

It is estimated that approximately three triple-road train trucks per day will transport product to Fremantle Port during weekdays. Product will be trucked from the Project along the mine site access road. From here it will be transported on public roads (classified as primary distributors by Main Roads Western Australia, with an RAV classification of Category 7) to the storage facility in Fremantle. On arrival, the product will be transferred to a designated storage area for shipping.

2.3 Social and Economic Justification and Alternatives Considered

The Munglinup graphite deposits have been known and sporadically explored since the early 20th century, with initial exploratory works commencing in 1917 and resulting in some small production for the war effort in the 1920s.

The development and implementation of the Project will provide an economic benefit to the communities of Munglinup, Esperance and Ravensthorpe by providing jobs and growing the local economy and the broader Western Australian community. The Project also provides Australia with its first graphite mine since 1945, when graphite was last mined from the area. The Munglinup graphite resource has been a strategically significant deposit since its discovery in the early 1900's when the region around the deposit was registered as a mining reserve for the purpose of protecting the resource for future development.

The Project will help meet the growing demand for inputs used in battery production to support the energy revolution currently taking place. With battery production poised for significant growth, graphite supply will be critical to sustaining this growth. Very few global operations exist in stable, low sovereign risk jurisdictions such as Australia, with the Project offering the potential to be a long term, stable, consistent supplier of high purity graphite.

MRC Graphite considers the Project will deliver social and economic benefits to the South West Region, wider State of Western Australia, and Australia. An outline of the potential social and economic costs and benefits associated with the Proposal is provided below.

Ongoing stakeholder engagement has been occurring since the beginning on the project and is detailed in APPENDIX B.

2.3.1 Social and Economic Justification

Social Benefits

MRC Graphite is aiming to engage a residentially workforce located in the Ravensthorpe or Esperance communities. The project will employee 144 people during construction and 80-100 people during operations. The Mine location allows staff and families to reside within an hour of the Site. These families add value to the towns in which they live and attract additional services and support for the wider community. The Project will increase direct and indirect employment opportunities for the local, regional, and State population during both the construction and operational phases.

There will be ongoing indirect job opportunities in areas such as transport, storage, shipping, supply of parts and reagents, itinerant equipment suppliers, fabrication, training providers and other professional services. Indirect employment includes to the provision of services for the workers and their families locally and regionally is also expected to be positively impacted.

Economic Benefits

The Munglinup Project is a high-grade natural flake graphite deposit, positioned to deliver specialty and high-grade graphite product. Graphite is considered to be a critical mineral in Australia due to the increasing demand for batteries and technology. The growing significance of these minerals is demonstrated through their use in the manufacture of mobile phones and computers, flat-screen

monitors, wind turbines, electric cars, solar panels, rechargeable batteries, defence industry technology and products, and many other high-tech applications.

Over the last few years there has been 9-15% annual global demand increased for lithium-ion batteries which is resulting in increased growth in the graphite market as well. Currently the global graphite production is 1.2Mt/annum with a forecast growth to 4Mt/annum to meet rising steel and battery demands. Munglinup is envisaged to contribute an additional 54kt/annum (on average) when operational. Australia is one of the first jurisdiction global to be able to produce all elements required for the production of batteries. Graphite comes in two forms with the combined graphite market worth around $13 Billion and forecasted to reach $17 Billion in 2020.

Key economic benefits associated with the Project include (AEMCO, 2020):

- The Proposal will have a sustained investment in the Australian economy. A high percentage of MRC Graphite's operational expenditure is expected to be spent within the Australian economy.
- MRC Graphite will support the local economy through locally sourced goods, utilities and services creating economic value and supporting job growth within WA and the broader Australian economy.
- MRC Graphite will contribute to the Australian economy over the life of the Project through payment of Local, State and Federal taxes. Munglinup is estimated to contribute AU$54.8M in royalties to the WA Government and AU$143.4M in Corporation Taxes.
- The capital expenditure for the project is AU$88M with a payback period of 2.7 years. From this direct spend Regional WA is predicted to grow by $184M during the construction period plus receive an employment benefit of 256 people.
- Beyond construction the Project is predicted to benefit the local area by up to $40M, the Goldfield Esperance Region by up to $25.1M and the remainder of WA by $22.2M. The total annual economic stimulus if estimated to be $87M for WA.

An economic assessment of the project has been completed by MRC Graphite; a copy of the report is provided in Appendix C-15.

2.3.2 Alternatives

This section outlines the justification for this Project and summarises the alternative options considered. The intent of this section is to provide an overview of the options that have been considered by the MRC Graphite to minimise the potential environmental impacts resulting from this Project. From MRC Graphite perspective, the "no action" option to prevent impacts on signifi1cant environmental is outweighed by the critical mineral status and economic benefit the Project brings to the local communities, the State and Commonwealth.

2.3.2.1 Benefits of the Project

Global production of natural graphite was estimated to be 952 kt in 2018. Flake graphite accounts for an increasing share of production, around 71% in 2017, growing with increasing demand from the battery industry. Amorphous graphite production has recovered from the Chinese closures at the beginning of the decade but is now in decline as demand falls. Amorphous graphite accounted for a further 28% of production in 2018 and specialist vein graphite less than 0.5% (Battery Limits, 2019).

China is the largest producer of natural graphite and accounted for around 60% of global supply in 2018. An increasing amount of China's production is consumed domestically across a range of end use applications, largely refractory bricks, but increasingly, highly processed material in Lithium ion battery anodes. Around 59% of Chinese natural graphite production was exported in 2018. Thie has been a shortage of graphite supply since 2010 due to China imposing a 20% export tax that effectively restricted graphite export 40% of production (AEMCO, 2020).

Chinese flake production declined by almost 30% in 2016 as the Chinese government closed flake capacity following environmental inspections. Production recovered in early 2017 but fell again from August with a new round of closures. Total Chinese flake output for 2017 was estimated to have

recovered by less than 10% to around 350 kt but fell again by around 7% in 2018 with subsequent inspections in June and October that year (Battery Limits, 2019).

Mozambique became the second-largest natural graphite producer in 2018 following the rapid ramp-up of the Balama flake graphite project, which opened in late 2017. Much of the production was exported to China for processing into spherical graphite for supply to the Chinese lithium-ion battery market. The Australia Government has identified Graphite as a Critical Mineral highlighting the impending demand graphite in coming years, many of which are fundamental to sizable growth markets: electric vehicles, rechargeable batteries, electronics, mobile devices and defense technologies (AEMCO, 2020). Establishing graphite project in Australia remove our reliance on international sources and allow for the potential secondary processing and manufacturing industries in Australia.

Between 2008 and 2018 global production of natural graphite declined by an average of 2.1 %/y. Major consolidation in the Chinese amorphous graphite industry, coupled with declining markets for low-value amorphous throughout the decade, led to an average fall in global amorphous graphite supply of 9.1 %/y 2008-2018. Meanwhile global production of flake graphite grew robustly to meet growing demand but has fallen back several times in recent years with ongoing government environmental inspections and temporary plant closures. Flake production grew by 4.6 %/y in 2007-2015 before declining in 2016 and then showing some recovery in 2017. Production then fell again in 2018 showing a growth rate average of 3.7 % per year in 2008-18 (Battery Limits, 2019).

The proportion of global production accounted for by flake graphite grew from 40% in 2008 to a peak of 71% in 2012 with a growing flake demand and a declining amorphous industry.

Currently the global graphite production is 1.2Mt/annum with a forecast growth to 4Mt/annum to meet rising steel and battery demands. Munglinup is envisaged to contribute an additional 54kt/annum (on average) when operational. Australia is one of the first jurisdiction global to be able to produce all elements required for the production of batteries.

2.3.2.2 Processing Options

The location for the processing plant and supporting infrastructure was originally considered for placement to the north of M74/245. During pre-feasibility this location was ruled out due to the identification of the Proteaceae Dominated Kwongkan Shrublands TEC and other List flora species. An alternative location for the processing plant and supporting infrastructure has been selected to the south-east of M74/245. This location has been identified as the best possible location. From an ecological perspective, the selected location removes the need to undertake clearing within the Proteaceae Dominated Kwongkan Shrublands TEC while also providing a shorter distance between the processing plant and the TSF.

Other processing options have been considered including processing at existing third-party facilities and construction of a demonstration plant at 1/3 scale with subsequent expansion to 400ktpa in year 3. For economic reasons MRC have elected to build and manage their own processing facility.

2.3.2.3 Mining Options

The sequential mining of the proposed pits allows for the potential backfilling of pits with mine waste. Although not forming part of this proposal due to uncertainties with the potential extension of resources which would be sterilised, the concept of backfilling will continue to be considered and evaluated as mining operations progress. Should it be economically viable to do so, backfilling of open pits will be thoroughly considered.

2.3.2.4 Tailings options

An option study was undertaken by Klohn Crippen Berger (KCB) considering location, disposal methods, dewatering options and associated design risks for the TSF (KCB, 2018). Five design options were considered:

1. Conventional Tailings Disposal
    - Upstream lift
    - Centreline lift

- Downstream lift

2. Thickened Tailings Disposal
   - Upstream lift
   - Centreline lift
   - Downstream lift
3. Filtered Tailings – Dry Stack
4. Partial In-Pit Disposal
5. Tailings and Waste Rock Co-Disposal

The TSF design selected was a thickened tailings disposal with a centreline lift. Whilst the current proposal is to construct a TSF to contain all estimated tailings, the concept of in-pit tailings disposal will still be considered and evaluated as the mining operations progress and resources are better defined.

2.3.2.5 Access Road

Access to the Project area was considered from both the west via Reynolds and Mills Roads, and the east via Farmers and Clayhole Roads. The western entry was ruled out as the major access route due to the requirements to cross the Munglinup River three times and pass through the Munglinup townsite. The existing western access is still envisaged to be upgraded to act as an emergency access track for light vehicles.

The eastern entry to the Project has been selected as the most appropriate access site for several social and ecological reasons. The development of an eastern access road will avoid the need to pass through the drinking water catchment area for the Munglinup town and prevents the need to establish another crossing on the Munglinup River which would interfere with the flows of the Munglinup River. An eastern access road avoids the need to pass through the town of Munglinup, reducing noise and traffic and prevent another river cross which could further impact the river flows.

It is acknowledged that both the Western and Eastern Access Route incorporate knowledge occurrences of Proteaceae Dominated Kwongkan Shrublands TEC. Consideration was given to avoiding this habitat, unfortunately this required the purchase of land on the adjacent farm properties which is consider good cropping land or the establishment of another river cross on the Munglinup River. The final route will take into consideration the location of MNES including the extent of the Proteaceae Dominated Kwongkan Shrublands TEC to minimise disturbance to these matters.

2.3.2.6 Power Supply

Two options have been considered for the power supply, these being:

1. Connection to the Southwest Power system which terminates at CBH's grain facility at Munglinup; or
2. Construction of an onsite diesel power plant.

A third option of a diesel solar hybrid station will also be investigated by MRC Graphite. MRC Graphite's preferred option is the establishment of the onsite power plant, as this reduces the need to erect overhead powerlines inside the adjacent parkland reserve and increases the power security of the Project.

2.3.2.7 Site Layout Changes

To reduce impact of identified important vegetation units (VU) and Priority Flora / Novel Species changes have been made to the Western Access, the Eastern Access, Waste Rock Landform footprints and the TSF.

Table 2-7 Benefits of Changing the Conceptual Disturbance Footprint

Values	Original Impact	Impact After First Review	Impact After Second Review	Total Regional Impact (%)
Vegetation Unit 1	49.22ha	42.36ha	42.34ha	8.2
Vegetation Unit 5	1.94ha	1.71ha	1.74ha	22.7
Vegetation Unit 11	10.53ha	5.65ha	5.65ha	21.6

Values	Original Impact	Impact After First Review	Impact After Second Review	Total Regional Impact (%)
Leucopogon aff. *canaliculatus*	832 plants	349 plants	175 plants	8.7%
Synaphea aff. *Drummondii*	86 plants	86 plants	13 plants	5.2%
Synaphea sp. Jilakin Flat Rocks Rd (R. Butcher et. al RB200)	86 plants	86 plants	0 plants	No Direct Impact
Possible Carnaby Cockatoo Foraging Habitat	5.76ha	5.72ha	6.02ha	1.43

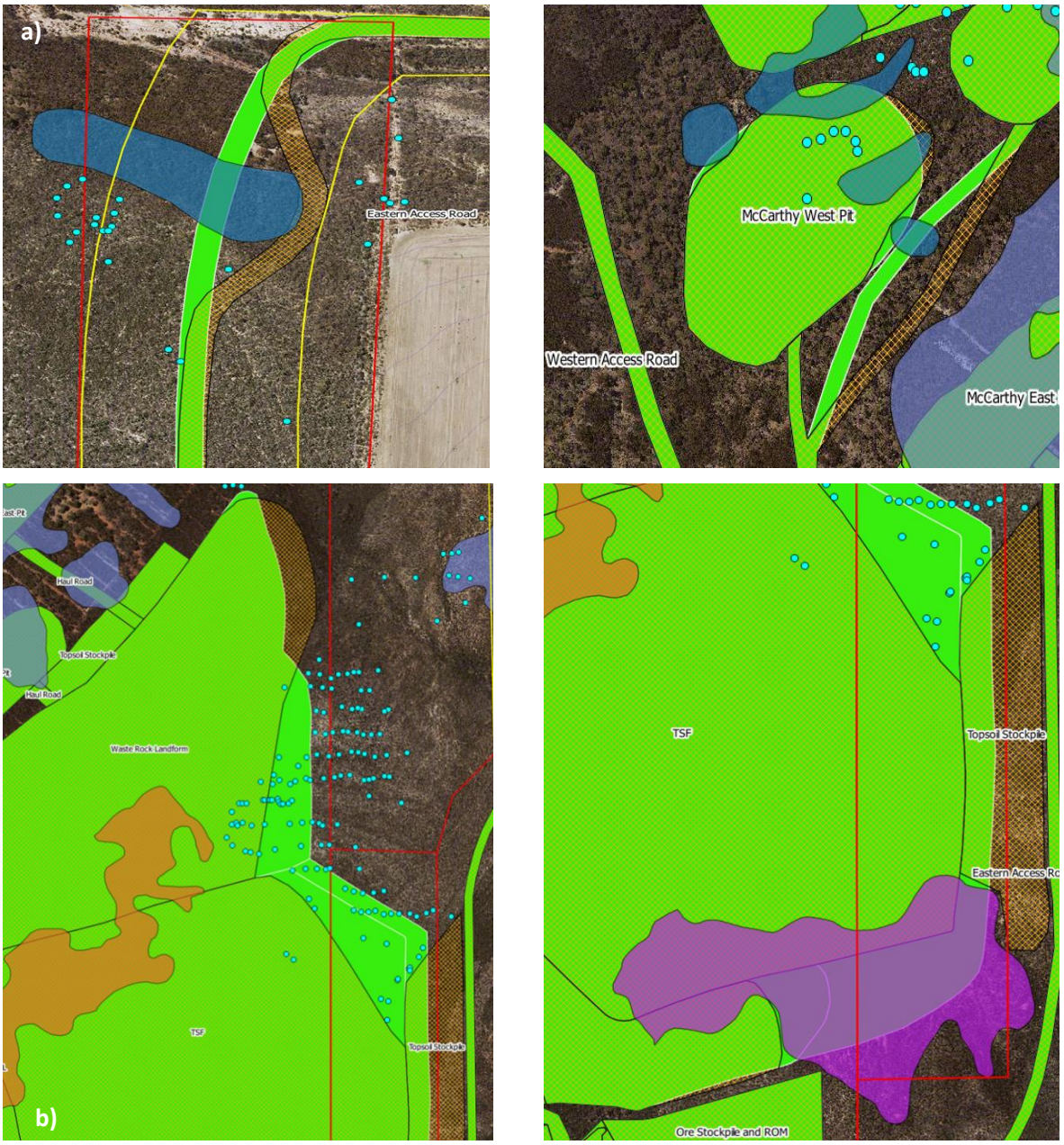


Figure 2-7 Site Layout Changes (a) Changes for UV5, b) Changes for Leucopogon aff. canaliculatus)

2.4 Project Schedule

The Project life is expected to be 15 years as minimum with construction and mining commencing within 6 months of all environmental and mining approvals being granted. Mining production will be

upscaled to full production over a 2 to 3-year period subject to market conditions. Key Project milesones are summarised in Table 2-8.

Table 2-8 Project Milestone

Milestones	Timeline
Decision on *EP Act* & *EPBC Act* Referral	Mar 2019
Completion of Definitive Feasibility Study (DFS)	Jan 2020
Supplementary *EP Act* submissions	Jul 2020
Supplementary Report Revised to Address DMA feedback	Nov 2020
Front End Engineering and Design (FEED)	Q2, 2021
Decision on Environmental Approval	Q2, 2021
Start construction and earthworks	Q4, 2021
Bulk SamplingMining	Q4, 2021
Commissioning	Q3, 2022
Production and Ramp-up	Q4, 2022

2.5 Closure and Rehabilitation

A conceptual Mine Closure Plan (MCP) has been developed in accordance with Statutory Guidelines for Mine Closure Plan (DMIRS, 2020). This plan will be revised and submitted to Department of Mines, Industry Regulation and Safety (DMIRS) as part of the mining approval process, and regularly updated over the life of the Project. The MCP will be updated every three years during the operations phase of the mine to ensure that by the time closure occurs, useful and detailed closure information has been included.

Provision of adequate financial resources for closure is critical to ensure that all closure requirements are reached and to finalise the Project without leaving residual liability for the company, the community, or the State. The provision will be based on rehabilitation cost estimates and updated in line with the area of ground disturbance. The adequacy of the provision will be reviewed annually at a minimum.

The life of mine for the Project is expected to be 15 years. It is envisaged that mining of each pit will occur concurrently and consecutively with some areas potentially available for rehabilitation while mining is occurring elsewhere. Rehabilitation will be implemented wherever possible during the operation of the Project as areas become available.

The conceptual closure objective for the Project is to establish a physically safe, geotechnically stable and non-polluting landform, capable of sustaining the appropriate and agreed post-mining land use. The preliminary site-specific closure objectives proposed at a high level are outlined in Table 2-9. These will be further refined, together with the development of completion criteria, as the closure planning process continues.

Table 2-9 Summary of Preliminary Closure Objectives

Aspect	Objectives
Compliance	• All legal conditions and commitments relevant to rehabilitation and closure will be met.
Infrastructure	• All contaminated equipment cleaned, salvaged or removed. • Infrastructure will be removed or retained in accordance with agreed post mining land use in consultation with relevant stakeholders. • Contaminated material remediated or removed from site.
Landforms	• Final post mining landforms to be safe, stable and non-polluting. • Constructed facilities to be non-polluting/non-contaminating. • Inadvertent public access to the open pits will be restricted as far as practicable.
Revegetation	• Disturbed surfaces rehabilitated to support agreed post mining land use. • Revegetation areas are resilient, self-sustaining and trending toward target ecosystem.
Water	• No long-term reduction in the availability of water to meet requirements of local users and environment. • Surface water drainage patterns managed where practicable to be consistent with the regional drainage function.

Aspect	Objectives
	• Ensure long-term water quality of local and regional surface water and groundwater resources are not compromised.
Fauna	• Rehabilitated areas provide appropriate habitat for local fauna.

3 Stakeholder Engagement

3.1 Key Stakeholders

Early engagement has allowed MRC Graphite to understand the community in which they are working and identify key stakeholders that will be impacted by or impact the Project, including:

- State Government;
- Federal Government;
- Local Government;
- Traditional Owners;
- Non-government organisations and interested groups; and
- Local community.

A comprehensive list of key stakeholders is provided in Table 3-1.

Table 3-1 Key Stakeholders

Stakeholder Group	Stakeholder	Key / Potential Interests
Landowners	Farms directly adjoining Project	Land Access/ Land Value.
Adjoining Landowners	Landowners/residents and businesses located in the Munglinup townsite.	Land Access/ Land Value. Opportunities for involvement.
	Landowners within proximity to the Project and proposed heavy vehicle transport route.	Land Access/ Land Value. Use of public roads and infrastructure.
Local Communities	Munglinup Township	Opportunities for Local Involvement.
	Jerdacuttup Community Association	Opportunities for Local Involvement.
Local Government	Shire of Esperance	Approvals. Land Access/Land Value. Use of public roads and infrastructure. Opportunities for local involvement.
	Shire of Ravensthorpe	
State Government	Environmental Protection Authority	Approvals – Part IV *EP Act*.
	Department of Mines, Industry Regulation and Safety	Tenement Conditions. Approvals - Mining Proposal and Mine Closure Plan. Mining Rehabilitation Fund. Rehabilitation standards. Safety in resource sector.
	Department of Water and Environmental Regulation (DWER) – EPA Services, Industry Regulation and Water	Approvals – Part IV and Part V *EP Act.* Bed and Bank Permits – *RiWI Act*
	Department of Biodiversity, Conservation and Attractions (DBCA)	Approvals. Threatened species. Flora, Fauna and habitat conservation. Baseline surveys and licences to take flora and fauna.
	Department of Lands, Planning and Heritage (DLPH)	Approvals – section 18. Heritage, cultural, ethnographic and archaeological sites.
	Main Roads	Use of public roads.
	Department of Fire and Emergency Services (DFES)	Fire breaks. Provision of emergency services.
	Southern Ports Authority	Movement of product.

Stakeholder Group	Stakeholder	Key / Potential Interests
Federal Government	Department Water, Agriculture and Environment (DWAE)	Approvals – Matters of National Environmental Significance.
Traditional Owners/Indigenous	Esperance Tjaltjraak Native Title Aboriginal Corporation	Heritage. Wetlands and rivers. Opportunities for involvement. Heritage surveys. Approvals.
	Goldfields Native Title Service (previously Goldfields Land and Sea Council)	
Interest Groups	South Cost Natural Resource Management	Potential interest in baseline surveys and significance of data. Approvals.
	Local Environmental Action Forum	
	Ravensthorpe Agricultural Initiative Forum	
	WA Native Orchid Study & Conservation Group	
	Munglinup Local Farmer Group	
	Munglinup Recreation Association	
Business	Local and regional businesses including those located in Munglinup, Esperance and Ravensthorpe.	Opportunities for involvement.
	Esperance Chamber of Commerce and Industry	
	Ravensthorpe Regional Chamber of Commerce	
	Goldfields Esperance Development Commission	
Public Utilities	Horizon Power	Power supply and infrastructure.
	Water Corporation	Water supply.

3.2 Stakeholder Engagement Process

MRC Graphite is committed to open and transparent communication with Project stakeholders throughout the life of the Project from development approval through to construction, operation, and mine closure. The objectives for this communication are as follows:

- To manage expectations by ensuring the communities and relevant stakeholders fully understand the nature of the Project, including the benefits and impacts that may be derived from Project operations.
- To promote community confidence in MRC Graphite, as an organisation, and the Project by ensuring open and transparent communication of Project development processes, impacts and risk management processes.
- To ensure a sustainable Project design and decision-making process by incorporating local community knowledge, views and concerns.
- To enable MRC to identify and address community concerns proactively and in collaboration with the community.
- To embrace a good neighbour policy.

A Community Engagement Plan has been developed to enable MRC Graphite to meet these objectives and outline the appropriate stakeholder engagements.

3.3 Stakeholder Engagement Consultation

Ongoing stakeholder consultation has been underway since February 2018. Key engagements to date with the following stakeholders are summarised in Table 3-2 below:

- Department of Biodiversity, Conservation & Attractions - Parks & Wildlife Service;
- Department of Mines, Industry Regulation and Safety;
- Department of Water and Environment Regulation;
- Esperance Chamber of Commerce and Industry;
- Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC);

- Goldfields Esperance Development Commission;
- Local Community Members and Businesses;
- Main Roads WA;
- Members of Government;
- Shire of Esperance;
- Shire of Ravensthorpe;
- Southern Ports Authority;
- Fremantle Ports Authority; and
- Surrounding Landholders.

Four community events held in Munglinup, Ravensthorpe and Esperance on the 20th and 21st February 2020 were attended by a total of 45 people comprising local community members (including land-owners and business owners,) Local Government, Industry groups and Government Agencies.

Feedback and concerns raised during stakeholder consultation can be categorised into the following key areas; overall, there was no obvious opposition to the Project:

- Waste landforms and rehabilitation plans;
- Groundwater drawing and recharge – impacts on river;
- TSF – Design and components;
- Current mine life;
- Air quality issues;
- Draw on community emergency response;
- Transportation and logistics;
- Monitoring of Munglinup River;
- Shipping Possibilities – Esperance;
- Preservation of animal corridors in bushland;
- Employment opportunities for locals and logistics;
- Plans for fire mitigation; and
- Level of confidence for proceeding.

A detailed Stakeholder Engagement Register is provided in Appendix B.

Table 3-2 Summary of Stakeholder Engagement

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
23-Feb-2018 02-Mar-2018 13-Mar-2018 12-Apr-2018 18-Apr-2018 23-27-Apr-2018 26-Jun-2018 28-Jun-2018 8-12-Jun-2018 12-Jun-2018 05-Oct-2018 22-Nov-19	Meetings/Briefings Site Visits Emails Letters	Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC).	An overview of the Munglinup Graphite Project was provided to ETNTAC. Various site visits to undertake archaeological and ethnographical assessment of the exploration and proposed Project area. Whilst there is no requirement for a formal agreement with the Traditional Owners due to native title having been extinguished within the Mineral Reserve, MRCG respect and appreciate the connection the Esperance Nyungar people have with the land and will ensure appropriate opportunities for consultation in respects of the Project and any reciprocal benefits that may assist ETNTAC. Meeting to enquire on the progress of the ETNTAC's Economic Opportunity Plan (EOP).	Concerns raised during consultation include: • Impacts to the Munglinup River. • Employment Opportunities. • Heritage Surveys and Cultural Monitors. ETNTAC provided a draft EOP to MRC who in turn have provided feedback.
22- Feb-2018	Meeting/Briefing	Department of Biodiversity, Conservation & Attractions - Parks & Wildlife Service.	Overview of the Project provided with the following points raised discussed: • Reserve Responsibility • Parks and Wildlife • Dieback assessments undertaken to date.	Mining and Parkland reserves not managed by DBCA.
7-Feb-2018 28-Mar-2018 9-Apr-2018 5-Jun-2018 6-Jun-2018 27-Jun-2018 21-Sep-2018 21-Sep-2019	Meetings/Briefings Emails Letters	Department of Mines, Industry Regulation & Safety.	Overview of the Munglinup Graphite Project was presented with discussion around approvals, timeline, baselines surveys, road access and tailings management. Correspondence with DMIRS regarding various POW applications. Mining Reserve Consultation.	Knowledge gaps for the Project area in terms of baseline environmental surveys need to be adequately addressed.

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
9-Aug-2018	Meetings/Briefings	Esperance Chamber of Commerce and Industry.	MRCG provided an update to the Esperance Chamber of Commerce and Industry including Social and Economic aspects of the Project (workforce requirements and working hours etc.), and Environmental baseline studies and Heritage Surveys undertaken.	Opportunities for MRCG to provide direct sponsorship for ECCI events. ECCI supportive of utilisation of residentially based workforce.
22-Feb-2018	Media Releases	Esperance/Munglinup Community.	Q&A discussion and recording carried out for inclusion in the weekly "Resources report for the Goldfields, Esperance, Mid-West and Wheatbelt region of WA", ABC Regional Radio. Presentation of current status and future developments of the mine.	
21-Feb-2018 20th and 21st August 2018 20-Feb-2020	Presentation Community Event	Landowners/ Community members, Key Stakeholders, Local Government and industry Groups.	MRCG provided an overview of the Company and the Project including: • Extraction and Processing methodology; • Projected mine life and tonnages to be mined and processed; • Proposed heavy and light vehicle access routes; • Environmental and heritage approval processes • Overall timelines for the Project. • Projected employment and economic impact for the Project; • Industry engagement strategies; • Future community engagement activities; • Key contact details.	Feedback/Concerns raised included: • Mine site reliance on Munglinup St John Ambulance service for medical emergencies. • Local sourcing of contractors to ensure direct economic benefit to the local community. • Opportunities for apprenticeships for local youth. • Truck movements on South Coast Highway – level of increased traffic. • Tailings Dam lining and assurance that tailings would not be released to the Munglinup River Catchment
10-Apr-2018 10-Jun-2019 19-Jun-2019	Emails Meeting/Briefing	Department of Water and Environmental Regulation.	Confirmation that the Munglinup Project is not located within a proclaimed surface or groundwater area. Potential application for preliminary works.	Advice given on how to fill out and submit a s41 application to progress.

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
17-Jul-2018 30-Jul-2018 2-Aug-2018 9-Aug-2018 20-Feb-2020	Meetings/Briefings Phone Call	Shire of Ravensthorpe.	Provided an overview of the Project to the Shire CEO and Manager Corporate and Community Services covering the following items: • Social • Economic – workforce and operating hours • Environmental – baseline surveys undertaken to date, community engagement plan. Discussions regarding road access options to the Mine site – utilising Mills Road for light and emergency services vehicle access. General discussion was had updating the project and discussing what the Ravensthorpe community meeting had discussed, and the potential questions from the Munglinup community	The Shire noted the information and made note of the issues related to noise and visual impact of the Galaxy mine, given the proximity to the township of Ravensthorpe. Shire advised the road was suitable for vehicle traffic up to semi-trailer.
22-Feb-2018 12-Apr-2018 23-Apr-2018 3-Aug-2018 8-Aug-2018 27-Aug-2018 21-Feb-2020	Meetings/Briefings Letters Emails/Letters	Shire of Esperance.	Various meetings to provide an overview of the Project and discuss specific Project details e.g. tenure approach and road access to the mine site. Notification of miscellaneous licence application. General discussion around the Project and working with local environmental and heritage groups.	The Shire noted the information and provided the following comments: • The Shire welcomed MRC Graphite's position in respect to a residentially based workforce. • The Shire was receptive to the position taken by MRCG in respect of local procurement – but was cautious about the actual reality between having a policy and ensuring that local businesses were provided with a real opportunity to tender for work. • The Shire also queried the number of truck movements involved in exporting the product, in the event that it was to be exported through the Esperance Port. • The Shire confirmed the current status of Clayhole Road with respect to approval for use by heavy vehicles. The Shire requested additional information regarding the miscellaneous licence (now surrendered) including size, annual tonnage.

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
14-Aug-2018	Phone Call Emails	Local Owners Community Members.	Introductory phone call from MRCG Senior Social Responsibility Advisor and provide details of community information sessions.	All those contacted had rudimentary knowledge of the Project and were keen to remain informed.
11-Jul-2018 16-Jul-2018	Meetings/Briefings	Goldfields Esperance Development Commission.	Overview of Project provided and discussion around key factors including: • Social – MRC previous involvement in community initiatives in Africa. • Economic – workforce numbers and operational hours. • Environmental – baseline surveys.	GEDC noted the information and advised the approach to workforce expecting to be sourced locally was consistent with the State Government regional development policy.
27-Aug-2018	Phone Call Meetings	Main Roads.	Discussion to outline the options being considered by MRCG for light and heavy vehicle access to the mine site. Product transport was also discussed in relation to the size of transport trucks and volumes estimated to be transported.	Main Roads advised that heavy vehicles had been approved for use on both Farmers Road and South Coast Highway. The intersection of Farmers Road and South Coast Hwy may require audit to confirm if it is compliant with current standards.
10-Aug-2018 08-Oct-2018	Meetings/Briefings	Southern Ports Authority.	Overview of Project provided and discussion around key factors including: • Social – MRCG previous involvement in community initiatives in Africa. Community Engagement Plan being utilised. • Economic – workforce numbers and operational hours • Environmental – baseline surveys. A second meeting was held to discuss the Logistic Study being undertaken to consider options for transport logistics.	Interest was expressed in the use of locally based workforce given recent redundancies at the Esperance Port. The number of truck movements was queried in the context of the impact on the Esperance Port Access Corridor and local residents. Southern Port Authorities advised of recent regulatory works undertaken to streamline the process of adding products to their licence and could see no issue with the export of graphite through the Esperance Port.
14-Jul-2018 27-Sept-2018	Meetings/Briefings	Member of Parliament – Hon Laurie Graham MLC.	Overview of Project provided and discussion around key factors including: • Social – MRCG previous involvement in community initiatives in Africa. Community Engagement Plan being utilised.	Mr Graham emphasised the importance of looking at residentially based workforce and that the Government would like to see positive action in respect of the procurement of local goods and services and utilisation of local businesses.

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
			• Economic – workforce numbers and operational hours. • Environmental – baseline surveys. A second meeting provided an update of the Project and activities undertaken in previous three months including the community information sessions, baseline surveys.	
10-Aug-2018	Meetings/Briefings	Member of Parliament – Hon Peter Rundle.	Overview of Project provided and discussion around key factors including: • Social – MRCG previous involvement in community initiatives in Africa. Community Engagement Plan being utilised. • Economic – workforce numbers and operational hours • Environmental – baseline surveys.	Mr Rundle noted the information presented and advised that he had been a keen advocate for residentially based workforces. Mr Rundle advised that he had also been in discussions with ETNTAC on the potential for commercial and employment opportunities related to the MRCG Project. Mr Rundle made comment that any additional utilisation of the Esperance Port would be beneficial to the Esperance economy and community given the recent cessation of iron ore exports through the port and the impact that this had on both the Port and Esperance economy. Mr Rundle advised that he had recently met with the Premier, Mark McGowan and had raised the prospect of downstream processing - emphasising the point that graphite, along with lithium, nickel and cobalt were critical to the future production of batteries. Mr Rundle made the comment that the current dialogue in the battery technology space seemed to be dominated by lithium – and the conversation broadened to include the other commodities.
16-Aug-2018	Meeting/Briefing	Office of Hon Peter Rundle MLA and Hon Colin De Grussa MLC.	Overview of Project provided and discussion around key factors including:	The representative noted the information and advised that through their experience as CEO of the ECCI, it had been difficult for local business to secure significant

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
			• Social – MRCG previous involvement in community initiatives in Africa. Community Engagement Plan being utilised. • Economic – workforce numbers and operational hours. • Environmental – baseline surveys.	business opportunities with mining proponents in the past.
12-Apr-2018 24-Apr-2018	Letter Phone Call	Local Landowner.	Notification of miscellaneous licence application. Discussions regarding activities that occur on Clayhole Road that could be impacted by the miscellaneous licence application.	Concern that Clayhole Road would be closed to public access. NOTE: Application Surrendered.
08-Oct-2018	Presentation	Esperance Rotary Club.	Presentation to 30 members of the Esperance Rotary Club, comprising local farmers and business leaders. MRC Graphite provided an overview of the Company and the Project including: • Extraction and Processing methodology • Projected mine life and tonnages to be mined and processed; • Proposed heavy and light vehicle access routes; • Environmental and heritage approval process • Overall timelines for the Project. • Projected employment and economic impact for the Project; • Industry engagement strategies; • Future community engagement activities; and • Key contact details.	Feedback/Concerns raised included: • Funding and sponsorship opportunities for local community groups. • Local sourcing of contractors and opportunity for local businesses to provide services. • Query regarding what roads would be used for mine access and potential upgrade at the intersection of Farmers Rd and South Coast Hwy.
10-Oct-2018	Meetings/Briefings	Member of Government – Rick Wilson MHR.	Overview of Project provided and discussion around key factors including: • Social – community engagement undertaken including the local community information sessions. • Economic – workforce numbers and operational hours.	Mr Wilson welcomed the approach by MRC to the employment of a local workforce and noted the information provided on the environmental approvals and heritage engagement.

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
			• Environmental – baseline surveys and approvals process. • Heritage – engagement with ETNTAC.	
11-Oct-2018	Meeting/Briefing	EPA Services.	Pre-referral meeting with the EPA Services to provide an overview of the Project and environmental matters	EPA Services provided information on their expectations and the level of detail they would like to see within the referral document.
11-Oct-2018	Meeting/Briefing	DoEE (Cth).	Pre-referral meeting with the DoEE (Cth) to provide an overview of the Project including the matters of national environmental significance. The following was discussed: • Overview of the Project. • Overview of the baseline surveys completed to date. • Discussion on each of the matters of national environmental significance identified.	DoEE provided information on their expectations and level of details they would like to see in the referral document.
23-Oct-2018	Meeting/Briefing	Munglinup Community.	A community update, attended by 15 people, was conducted in an informal interactive way covering the following topics: • Update on proposal aspects – processing methodology, mine life, vehicle access routes, environmental and heritage process, timeline of Project. • Community engagement.	Feedback/Concerns raised included: • Establishment of a mine worker camp in Munglinup. • The positive impact of the current use of local contractors was noted. • Local landowners had received notification of the Application to lodge Munglinup River and tributaries as a registered site – as this impacted their farms. Concerns were raised as to the nature under which the application was lodged and the absence of consultation and discussion with the local land-owners by the parties that lodged the application.
20-Nov-2018 18-Jan-2019 21-Jan-2019 22-Jul-2019	Meeting/Briefing Phone Conversation	Department of Planning, Lands and Heritage.	Discussion of registered sites and identify other heritage values. s18 Application.	Aidan reviewed a draft version of the application before it was formally submitted. Once formally submitted Aidan was notified of the updated reference number.
20-Feb-2020	Meeting/Briefing	Ravensthorpe Community	The community briefing was attended by 10 people, the briefing provided an overview of the upcoming events,	Feedback/Concerns raised included: • Waste Landform design

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
		Landowners/ Community members, Key Stakeholders, Local Government and industry Groups.	process and information on the construction and running of the mine. • Update on proposal aspects – processing methodology, mine life, vehicle access routes, environmental and heritage process, timeline of Project. • Community engagement.	• impact on the river • Financial benefits of the mine • impact on threatened and priority species • Major flood events • Hydrogeological recharge of the river • Groundwater dependant ecosystems • TSF design.
20-Feb-2020	Meeting/Briefing	Landowners/ Community members, Key Stakeholders, Local Government and industry Groups.	The community briefing was attended by 14 people, the briefing provided an overview of the upcoming events, process and information on the construction and running of the mine. • Update on proposal aspects – processing methodology, mine life, vehicle access routes, environmental and heritage process, timeline of Project. • Community engagement.	Feedback/Concerns raised included: • Road design and use • life of mine • mining methods • TSF design and use • Air quality concerns • Draw on community-based emergency services.
21-Feb-2020	Meeting/Briefing	Esperance LEAF Community Group.	This meeting was attended by 5 members from the Local Environmental Action Forum (LEAF). A brief introduction was given from LEAF to their organisation and history, and what they do for the area.	Feedback/Concerns raised included: • What graphite is used for? • What will Munglinup's graphite be used for? • Safety for transport of graphite bulka bags • Quenda populations • Monitoring of the Munglinup River • Release of excess water and quality • Groundwater drawdown and effect on the river • How the site will be powered • How will stockpiles be stored.
21-Feb-2020	Meeting/Briefing	Esperance Community Land-owners/ Community members, Key Stakeholders, Local Government and industry Groups.	The community briefing was attended by 120 people, the briefing provided an overview of the upcoming events, process and information on the construction and running of the mine. • Update on proposal aspects – processing methodology, mine life, vehicle access routes,	Feedback/Concerns raised included: • Waste Landform design • Life of Mine • Final rehabbed form • Recovery process of graphite • Trucking to Fremantle rather than Esperance • Fire mitigation process

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
			environmental and heritage process, timeline of project. • Community engagement.	• Likelihood of mine proceeding.
17-Aug-2020	Email	DWER	DWER Licencing and Allocation Officer reviewing licencing under the RIWI Act. Request for Spatial data for clarification	Shapefiles sent to Julie Pech on 20/8/2020
4-Sep-2020	Email	DWER DAWE	Supporting Information Document, key matters for revision to meet EPA services requirements: • Flora and Vegetation: ▪ Additional discussion and mitigation of the potential impacts to the three potentially novel taxa found in the project area ▪ Further discussion and mitigation of the potential consequences of the introduction of Phytophthora dieback on flora and vegetation • Inland Waters: ▪ Please provide additional information to support the proposed water supply for the mine ▪ Please provide further discussion on the ecological values associated with the Munglinup River • Terrestrial Fauna: ▪ Further information is required on the habitat for Malleefowl, Redtail Phascogale, Short Ranged Endemics and Chuditch, such as additional survey reports or appropriate justification for the level of survey effort undertaken. ▪ Please provide a consideration of the offsets required for impacts to listed conservation significant fauna species found within the development envelope	• Detailed comments were formed from the Government agencies reviewing the proposal. Each of the advised actions to be addressed on revision of the additional information report. • Supplementary report document updated with addition information required from baseline providers and MRCG. • Meeting with DWER and DAWE arrange to clarify requirements.
24-Sep-2020	Meeting / Briefing	EPA Services DAWE	• Offsets of Chuditch and Malleefowl • CBA/Economic benefit information	• Offsets are required for TEC, Chuditch and Malleefowl

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
				• Clarification of what is required for Economic Benefit information required for submission
15-Feb-2021	Email	DWER DAWE	• Feedback from the Additional information report received via email. • Novel Flora Species (DWER) ▪ Additional discussion and mitigation of the potential impacts to the three potentially novel taxa found in the project area ▪ Further discussion and mitigation of the potential consequences of the introduction of Phytophthora dieback on the novel flora species • Offsets (DAWE) ▪ Revised Offset calculator to include offsets for the Ecological Corridors ▪ Compiled a memo explaining the approach, values adopted for the Offset calculator, ▪ Revise Offset calculator to include direct and indirect hectares (9.16ha of possible breeding, 310ha pf possible foraging and the 5% or 16ha of indirect impacts) of impact for Malleefowl – DAWE believe MRC must offset 336ha of Malleefowl habitat	• Meetings set up with both DAWE and DWER for further clarification
22-Feb-2021	Meeting	DWER	• Novel Flora Species ▪ Additional discussion and mitigation of the potential impacts to the three potentially novel taxa found in the project area ▪ Further discussion and mitigation of the potential consequences of the introduction of Phytophthora dieback on the novel flora species	• Disturbance footprint was revised to minimise the direct impact to the three novel flora species
24-Feb-2021	Meeting	DAWE	• Offsets (DAWE) ▪ Revised Offset calculator to include offsets for the Ecological Corridors ▪ Compiled a memo explaining the approach, values adopted for the Offset calculator,	• Documentation provided to MRC to assist with values and inputs into the offset calculator. • Additional detail on selection process for risk of lost estimates, time until ecological benefit and

Dates	Engagement Type	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback
			▪ Revise Offset calculator to include direct and indirect hectares (9.16ha of possible breeding, 310ha pf possible foraging and the 5% or 16ha of indirect impacts) of impact for Malleefowl – DAWE believe MRC must offset 336ha of Malleefowl habitat	confidence in results and detail in the weight ranking rationale.

4 Environmental & Regional Context

4.1 Studies and Investigations

Several baseline studies have been undertaken across the Project Area. Studies which have been completed as part of the supplementary information request are highlighted green in Table 4-1 and located in APPENDIX C: BASELINE SURVEYS

Table 4-1 Completed and Planned Baseline Studies for the Munglinup Graphite Project

Factor	Study	Year
Flora & Vegetation	Ecologia Environment. Munglinup Graphite Project Flora and Fauna Assessment.	2015
	Woodman Environmental. Peer Review of Consultant Report Level 2 Flora and Vegetation Assessment in the Munglinup Area.	2018
	Woodman Environmental. Survey for TEC 'Proteaceae Dominated Kwongkan Shrublands of the southeast coastal floristic province of Western Australia' and habitat for the Threatened taxon *Rhizanthella johnstonii.*	2018
	Woodman Environmental. Flora and Vegetation Assessment – Spring Survey.	2019
	Woodman Environmental. Desktop Review of Potential Regional Extent of Vegetation Units.	2019
	Woodman Environmental. Flora and Vegetation Assessments.	2020
	Woodman Environmental. Flora and Vegetation Impact Assessment Memo.	2020
Fauna	Ecologia Environment. Munglinup Graphite Project Flora and Fauna Assessment.	2015
	Biostat. Review and Gap Analysis of the fauna assessment for the Munglinup Graphite Project.	2018
	Red Dog Environmental. Munglinup Complimentary Fauna Assessment.	2018
	Red Dog Environmental. Extended Fauna Assessment E74/565. Munglinup Graphite Project.	2018
	Biota. Munglinup Graphite Project Short Range Endemic Fauna Pilot Study.	2018
	Biota. Munglinup Graphite Project Subterranean Fauna Pilot Study.	2018
	WRM. Munglinup Graphite Project Aquatic Values of the Munglinup River: Literature Review.	2018
	WRM. Munglinup Graphite Project Baseline Water Quality & Aquatic Fauna Survey of the Munglinup River.	2018
	Western Ecological. Level 2 Fauna Survey – Munglinup Graphite Project.	2020
	Western Ecological. Vertebrate Impact Assessment Memorandum – MRCG Munglinup Graphite Project.	2020
	Invertebrate Solutions. Survey for Short Range Endemic Fauna for the MRCG Graphite Project, Munglinup, Western Australia.	2020
Surface Water	Rockwater. Initial Desktop Hydrology Assessment for Proposed Mining Operation at Munglinup Graphite Project.	2018
	Rockwater. Hydrological Review - Report for MRC Graphite Pty Ltd.	2020
Groundwater	Rockwater. Desktop Hydrogeological Assessment.	2018
	Rockwater. Stage 2 Hydrogeology Assessment.	2019
	Rockwater. Stage 3 Hydrogeology Assessment.	2020

Factor	Study	Year
Dieback	Glevan Consulting. Munglinup *Phytophthora* Dieback Occurrence Assessment.	2018
	Great Southern Bio Logic. *Phytophthora* Dieback Occurrence Survey MRC Graphite – Munglinup.	2020
Soil and Landform	Integrate Sustainability. Munglinup Graphite Project Soil and Landforms Desktop Review and Field Assessment.	2018
Material Characterisation	Integrate Sustainability. Munglinup Graphite Project Material Characterisation Assessment.	2018
Heritage	AAA. Report of an Ethnographic and Archaeological Survey of Proposed Munglinup Graphite Project.	2018
Noise	Herring-Storer Acoustics. Desktop Noise Assessment.	2018
	Herring-Storer Acoustics. Background Noise Monitoring.	2019
Ecological Linkages	Ecological Linkages Assessment.	2020

4.2 Climate

The Project is located along the South Coast in the Goldfields-Esperance region of Western Australia. The climate of this region is temperate Mediterranean with warm summers and mild to cool winters.

Temperatures and rainfall data were retrieved from the Bureau of Meteorology (BoM) weather recording station at Munglinup West (station number 012044) from 2002 to 2020. The mean annual monthly temperature maximum recorded at the station is 23.3°C and minimum is 10.6°C. On average the warmest month of the year is January with a mean maximum temperature of 29°C. July is the coolest month with a mean minimum temperature of 6.6°C. The mean annual rainfall is 450.8mm, with the lowest average monthly rainfall being 26.8mm in December, and the highest average monthly rainfall being 47.2mm in August (BoM, 2020). This information is shown in Figure 4-1. Average dam evaporation exceeds average rainfall in all months of the year by a factor of three (Luke, et al., 1988).

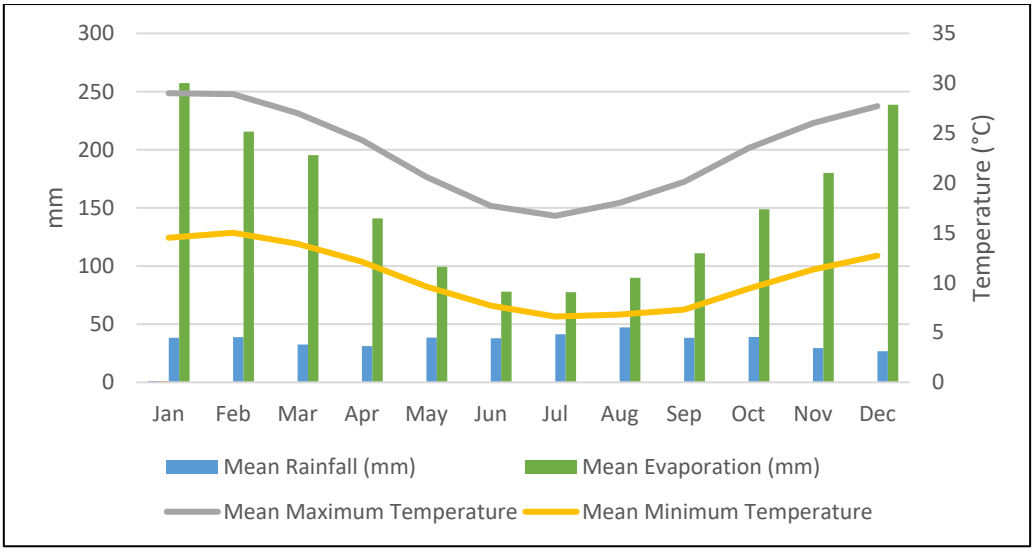


Figure 4-1 Mean Temperature and Rainfall Recorded at Munglinup West from 2002 to 2020 (BoM, 2020)

4.3 Topography and Soils

4.3.1 Landforms

The Project is located within the Esperance Plains Interim Biogeographic Regionalisation of Australia (IBRA) zone and the Recherche (ESP2) IBRA Subregion. The ESP2 subregion is characterised by Quaternary coastal sandplains and dunes overlying Proterozoic gneiss and granite as well as Eocene and more recent coastal limestones (IBRA, 2001).

Broad level soil landscape mapping has been completed across Western Australia. The broader Munglinup area is located within the Stirling Province. The Stirling Province is described as laterised plateau on tertiary sediments dissected at fringes with emergent quartzite ranges, coastal headlands of gneisses and migmatites (Purdie, et al., 2004). The Stirling Province is further broken into zones. The Project is within the Esperance Sandplain (245) landscape mapping zone. The landforms of the area are level to gently undulating plains dissected by a number of short rivers flowing south to meet the ocean (Purdie, et al., 2004).

The land surface within the vicinity of the Project is dominated by valleys and ridges associated with the Munglinup River (Figure 4-2). The lowest point of the land surface is 64m above sea level and rises to 158m on ridges which occur outside the tenement boundary (ISPL, 2018). Within the tenement boundary the lowest point is 70m above sea level within the Munglinup River valley to the south west corner, with the highest feature rising to 130m above sea level along a small hill in the northern portion of the tenement (ISPL, 2018). Across the surrounding area, slope angles are relatively flat with the greatest slope angle being 10° (ISPL, 2018). The lowest slope angle is 0.2° and occurs primarily across the farmland areas and along the plateaus. Slope angle is greatest within the valleys, particularly along the Munglinup River and its tributaries (ISPL, 2018). This suggests that significant erosion has occurred over time in these areas.

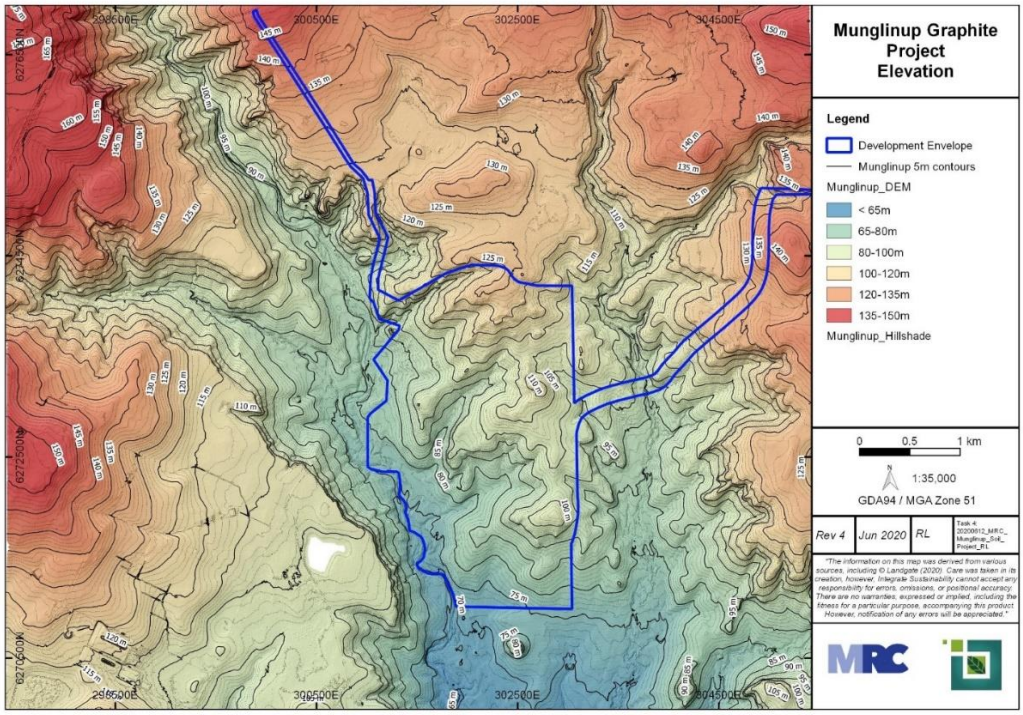


Figure 4-2 Landforms of the Project Area

4.3.2 Soils

Soils of the Esperance Sandplains (245) landscape zone are generally grey fine sandy duplex soils and fine sands (Purdie, et al., 2004). The landscape zones have been further classified into land mapping systems. Within the Esperance Sandplains, two land systems have been identified within the Project area, the Young System and the Munglinup System. The Young System is characterised by river valleys deeply incised into Tertiary sediments with grey shallow sandy duplex soils and grey deep gravelly soils (Nicholas & Gee, 1998). The Munglinup System is characterised by gently undulating plains and rises with some level plains consisting of Tertiary sediments overlying undulating Archean granite and gneiss basement with grey deep and shallow sandy duplex soils, moderately deep sandy gravels and pale deep sand (Nicholas & Gee, 1998).

At a finer scale, two subsystems, Young 1 Subsystem and the Munglinup 1 Subsystem, are located within the development envelope. The Young 1 Subsystem is characterised by rocky outcrops and breakaways with gullies along hillslopes. The soils are grey shallow sandy duplex soils (Nicholas & Gee, 1998). The Munglinup 1 Subsystem is characterised by drained plains and rises with gentle slopes.

The soils are a mixture of deep and shallow sandy duplex soils and deep sandy gravels with occasional clays and other duplex soils (Nicholas & Gee, 1998). Detailed descriptions of each subsystem are provided in Table 4-2 and their extent across the Project presented in Figure 4-3.

Table 4-2 Land Systems of the Project Area (Nicholas & Gee, 1998)**.**

Land System	Code	Description
Young 1 Subsystem	245Yo_1	An incised river valley (<60m deep) with breakaways, rock outcrop, short gullies along hillslopes and alluvial plains. Grey shallow sandy duplex soils associated grey deep sandy duplex (gravelly) soils. Minor pale deep sands, brown deep sands, unnamed clays and shallow skeletal soils.
Munglinup 1 Subsystem	245Mu_1	Externally drained plains and rises with gently inclined slopes some small level plains on upper slopes and catchment divides. Grey deep and shallow sandy duplex (gravelly) soils and moderately deep sandy gravels. Minor pale deep sands, unnamed clays and other duplex soils.

In June 2018, ISPL completed a detailed soil survey to provide information on the properties of soils within the Project area on M74/245. This survey included an examination of the soil resources and any adverse soil properties which may influence rehabilitation and closure activities. ISPL identified seven soil types within the tenement boundary (ISPL, 2018). These included:

- White gravelly sand;
- Grey sandy duplex;
- Brown loam duplex;
- Alkaline grey loam duplex;
- Calcareous brown clay loam; and
- Deep brown red silt loam.

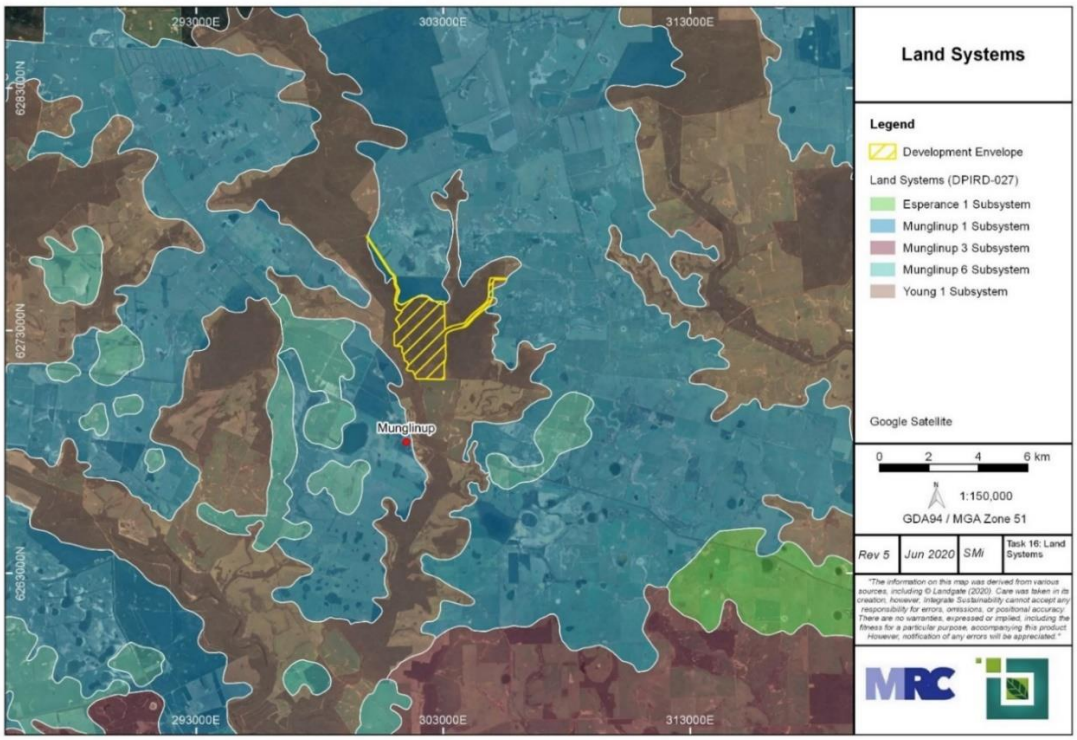


Figure 4-3 Land Systems of the Project Area

Overall, all of the soil types within the Project are nutrient deficient with low fertility, this is common for soils of the south-west and should not be a limiting factor for native vegetation establishment. Soil profiles indicated a very shallow (2-5cm) organic material layer which included leaf litter and

degrading material with topsoils in the A horizon averaging between 20 to 30cm deep. In many locations the topsoil overlays a clay or clay loam B horizon. Four of the soil types show high exchangeable sodium percentage (ESP) with values over 6%, commonly these soils also have a higher clay content with high sodium levels. This indicates that these soils are potentially dispersive. The most common soil type within the Project area is the Brown Loam Duplex, the majority of available growth medium material is likely to come from this soil type. A summary of the characteristics of each soil type is provided in Table 4-3.

Table 4-3 Soil Types of the Project Area

Soil Type	Description
White Gravelly Sand	Pale with a mottled colour of grey white with a high gravel content. Slightly acidic pH (5.5 to 6). Soil is non-saline and sandy in texture. A horizon extends to 25cm at which point a rock and clay hardpan is reached. Associated with the Kwongkan TEC.
Grey Sandy Duplex	Grey in colour and sand in texture and the pH is slightly acidic (6 to 6.5). Topsoils are non-saline (0.06dS/m) but have a high iron content (42.29mg/kg). A horizon extends to 25cm. At 25cm a clay hardpan is reached which is yellow in colour and is very difficult to break. Occurs within valleys and drainage areas.
Brown Loam Duplex	Brown to dark brown in colour and sandy loam in texture. Slightly acidic to neutral pH (6 – 7.3) and is non-saline. A horizon extends up to 35cm at this point, or shallower, a red clay hardpan is hit which is very compacted and difficult to dig into. Occurs along flat and slightly sloping areas.
Alkaline Grey Loam Duplex	True duplex soil with an A horizon grey brown in colour and sandy loam in texture, neutral pH (7.5 to 8.7), non-saline and calcareous. A horizon extends from 5-20cm. B horizon light grey to white and clay loam in texture, alkaline pH (8.7 to 9.6), non-saline and calcareous.
Calcareous Brown Clay Loam	Light brown in colour and sandy loam in texture. Alkaline pH (7.8 – 8.5), non-saline, calcareous. No delineation between the A and B horizon. Extends to 50cm.
Deep Brown Red Silt Loam	Brown red colour and is loam to silt loam in texture. Alkaline pH (7.9 – 8.3), non-saline, calcareous and strongly cohesive structure. Strongly associated with the 'spear tree country' of *Eucalyptus platypus* with a thick leaf litter cover of 75 to 100%.

4.4 Hydrology

Topography across the Project is low to moderate, with relief of less than 40m. The Project lies within the Esperance Coast Topographic Drainage Division and the Munglinup River sub-catchment, with drainage trending southwards via two main features, the Munglinup River and its tributary, Clayhole Creek (Rockwater, 2018a). The Munglinup River traverses the south-western corner of M74/245 (Figure 4-4).

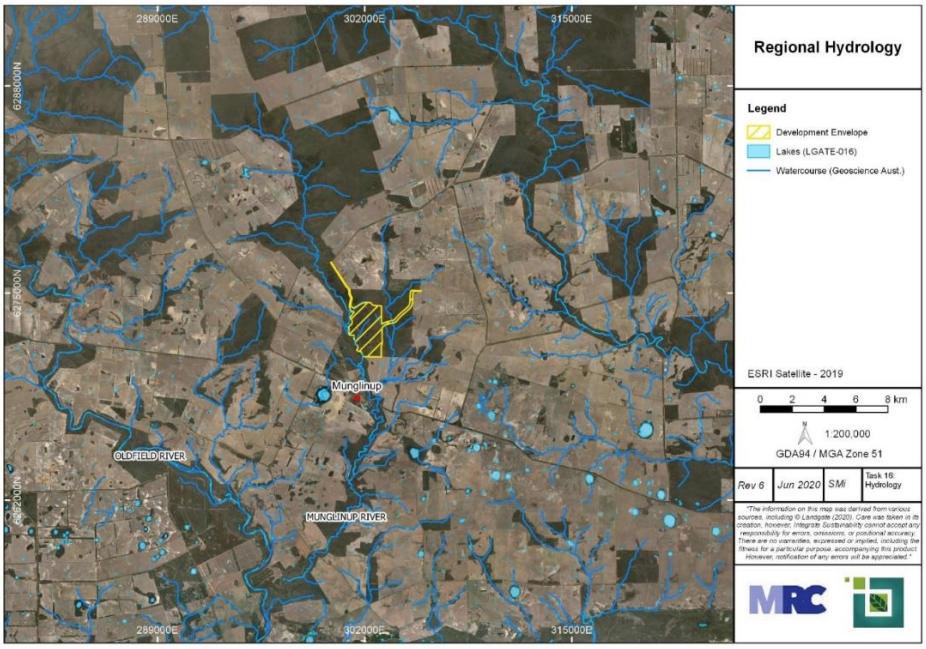


Figure 4-4 Project Area Regional Hydrology

The Munglinup River sub-catchment has an area of approximately 33,600ha originating on the sandplain north of the South Coast Highway and the Project (Rockwater, 2020a) (Appendix C-1); passing through the town of Munglinup and discharging into the Oldfield River and to the Oldfield Basin on the Southern Coast of Western Australia. Drainage across the Project area tends southwards via Munglinup River and Clayhole Creek, a tributary of the Munglinup River (Rockwater, 2018a). The Munglinup River originates on the sandplain north of the Project area and connects with inflow from Clayhole Creek approximately 3km south of the Project area.

The Munglinup River is ephemeral, flowing predominantly in the winter months. The corridor in which the river flows is well vegetated, with land surrounding the corridor being cleared for agricultural uses including cropping and grazing (Rockwater, 2020a). Within the Project area there are numerous small tributaries that drain south-westwards to meet Munglinup River. The proposed eastern mine access road on L74/55 will cross over the main channel of Clayhole Creek, in addition to a smaller tributary.

The Munglinup River and numerous unnamed small tributaries flowing south-westwards into the river, flow across or close to the planned mine infrastructure. For the purpose of the study, the tributary creeks were named Creeks A to G (Figure 4-5). The proposed eastern access road alignment crosses two watercourses – a small tributary and the main channel of Clayhole Creek. For the study, the tributary and main channel upstream of the access road waterway crossing were referred to as CC Trib and CC Main, respectively (Figure 4-5).

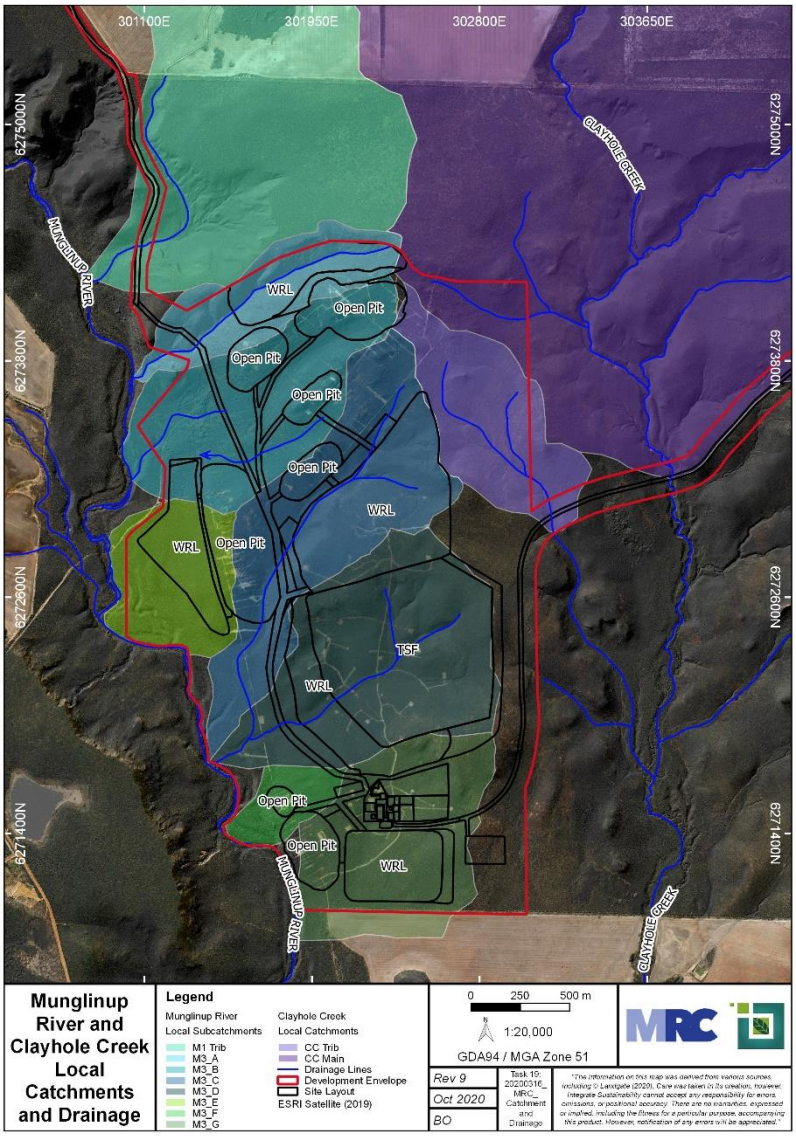


Figure 4-5 Project Area Local Catchments and Drainage Lines

Wetland Research and Management group completed a baseline assessment of water quality in the Munglinup River in April 2018. In general, the water quality of the Munglinup River can be considered saline, alkaline, clear and well oxygenated (Wetland Research and Management, 2018). Concentrations of heavy metals are mostly below the limit of detection and are not of ecological concern (Wetland Research and Management, 2018). Boron was elevated; however, this is often naturally occurring and influenced by groundwater (Wetland Research and Management, 2018). Overall, the Munglinup River is in relatively good condition and considered of moderate regional conservational value largely due to past anthropogenic disturbances such as clearing and agriculture (Wetland Research and Management, 2018). The samples represent low flows in the river, as they were taken in a relatively dry autumn; there had been only 3.2mm of rainfall earlier in April 2018, and no major rainfall after a recording of 22mm on 15 March 2018 (Rockwater, 2020a).

4.5 Hydrogeology

An initial desk-top assessment conducted by Rockwater (Rockwater, 2018a) (which formed the basis of the Stage 1 report), presented the results of the assessment using data available to 26 July 2018. It was subsequently updated to include the results of the test-pumping of the existing bores HDRC01 to 04, and preliminary numerical modelling (Rockwater, 2018). A Stage 2 report was produced in March 2019 (Rockwater, 2019) that included the results of additional investigation drilling, bore construction, test-pumping, and updated numerical modelling.

An additional report was commissioned in 2019 to address groundwater aspects of the EPA 2018 Environmental Factor Guideline – Inland Water. This report also includes the 2019-2020 additional water bore installation and testing, the bores were developed as additional water supplies and groundwater monitoring bores (Appendix C-2).

The Ravensthorpe 1:250,000 Hydrogeological Map (Johnson, 1998) shows the Project includes alluvium and minor colluvium, which contain minor local aquifers, granite gneiss and migmatite, which contain very minor local aquifers with brackish to saline groundwater (Rockwater, 2020b). The Ravensthorpe area is almost entirely underlain by fractured and weathered Archaean Proterozoic granite, gneiss and greenstone. The hydrogeology of the basement rocks is generally complex with groundwater occurrence restricted to joints, fractures and sections of the weathering profile; hence basement rocks are considered minor localised aquifers (Figure 4-6) (Johnson, 1998).

The Munglinup catchment has a very high run-off during storm events, due to the basement granitic-gneiss and weathered profile, although annual run-off is very low (approximately 1% of annual rainfall) indicating good moisture retention in the soils (AEMCO, 2017).

Historic groundwater drilling surrounding the Munglinup townsite from 1990 indicates that fine to coarse grained alluvium associated with the Munglinup River extends to depths of 19 to 36m and overlies amphibolitic or granitic bedrock (Rockwater, 2018b). Groundwater was recorded as saline and forming a locally minor aquifer (Rockwater, 2018b).

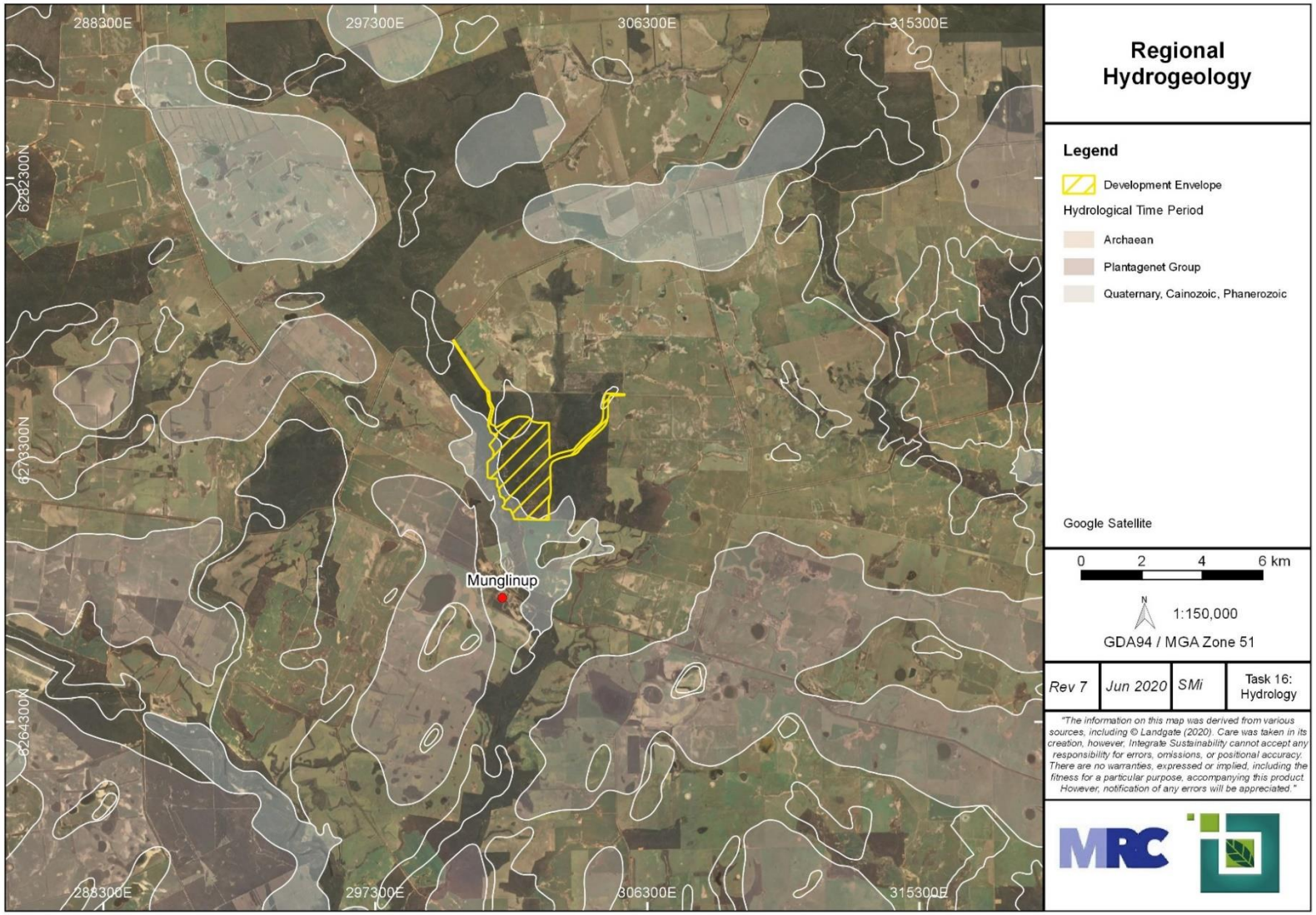


Figure 4-6 Project Area Regional Hydrogeology and Aquifers

4.5.1 Site Hydrogeology

The Project area lies on a lightly dissected peneplain which rises from the coast in the south to about 140m AHD at the northern end of tenement M74/245. The peneplain is more-steeply incised along the Munglinup River. Elevated areas are generally covered by sandy soils, whereas there is colluvium with minor alluvium and rock outcrops in the incised areas.

Hydrogeological investigations completed between 2018-2020 show that weathered gneissic rocks associated with the graphitic ore, and the adjoining host rocks, are moderately permeable along a northerly-trending linear zone in the western part of the Project area, extending from north of Halberts Main pit to Halberts South. Transmissivities (hydraulic conductivity multiplied by aquifer thickness) in the zone generally range from 5 to 40m^2/d. The permeable areas are likely to be bounded by granitic/ gneissic rocks and amphibolite of low permeability, and so pumping rates from water-supply or dewatering bores are likely to diminish markedly in the medium term (Rockwater, 2020b).

Groundwater is recharged by the infiltration of rainfall and runoff following heavy rainfall. Groundwater levels and groundwater quality data indicate that there is likely to be hydraulic connection between groundwater in the Project area and water in the Munglinup River (Rockwater, 2020b) (Figure 4-7). Groundwater will discharge to the river at times of low river flows; and water may flow from the river into adjacent rocks at times of high flows.

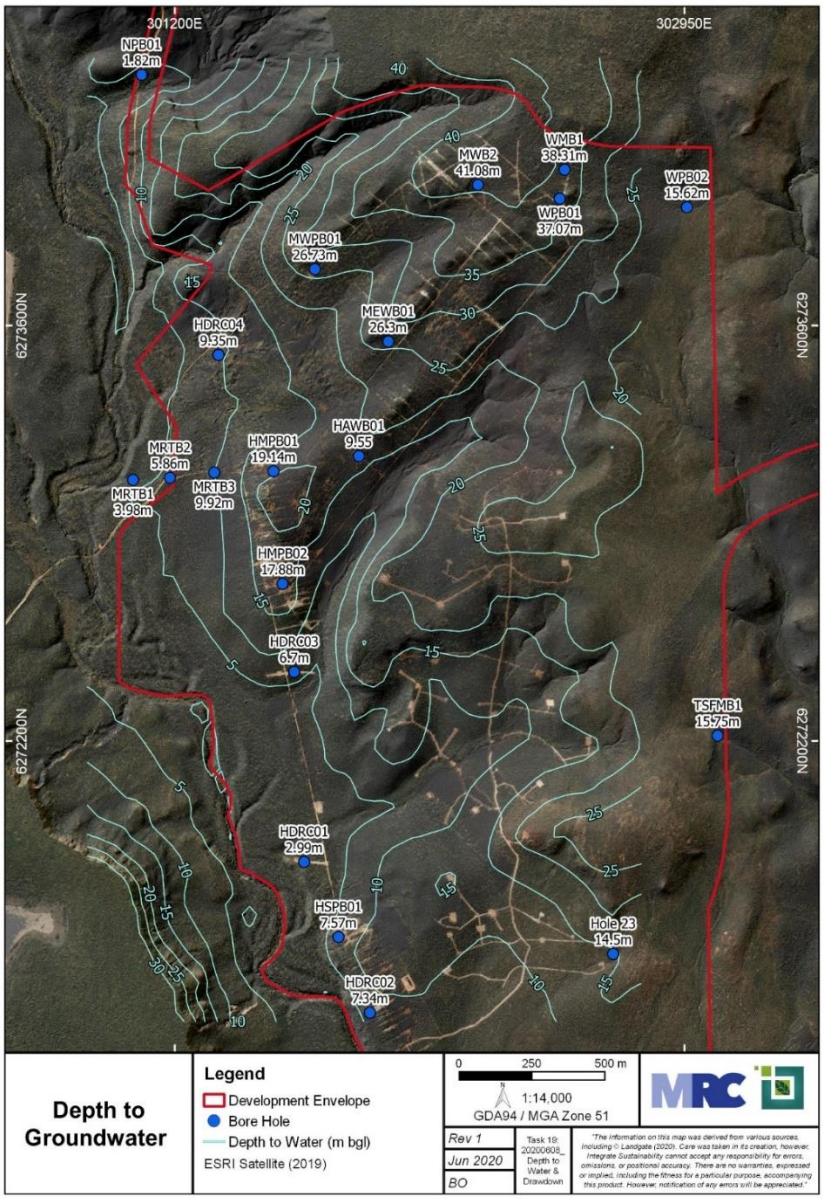


Figure 4-7 Depth to Groundwater

Standing groundwater levels for the bores (Figure 4-8) at the Munglinup mine-site, compared with those for two of the Munglinup townsite holes, and for one bore in the WIR database show that regional groundwater levels reflect the topography, and range in elevation from 56m AHD at Munglinup to 81m AHD in bore MEWB01 at the McCarthy East deposit, and up to 94.1m at NPB01. The water-level configuration indicates that the groundwater is flowing towards the Munglinup River, and towards the ocean to the south. Water levels in the Project area indicate groundwater flow to the south and south-west. Groundwater levels in the western bores are similar to topographic levels along the Munglinup River, suggesting hydraulic connection between the river and the groundwater.

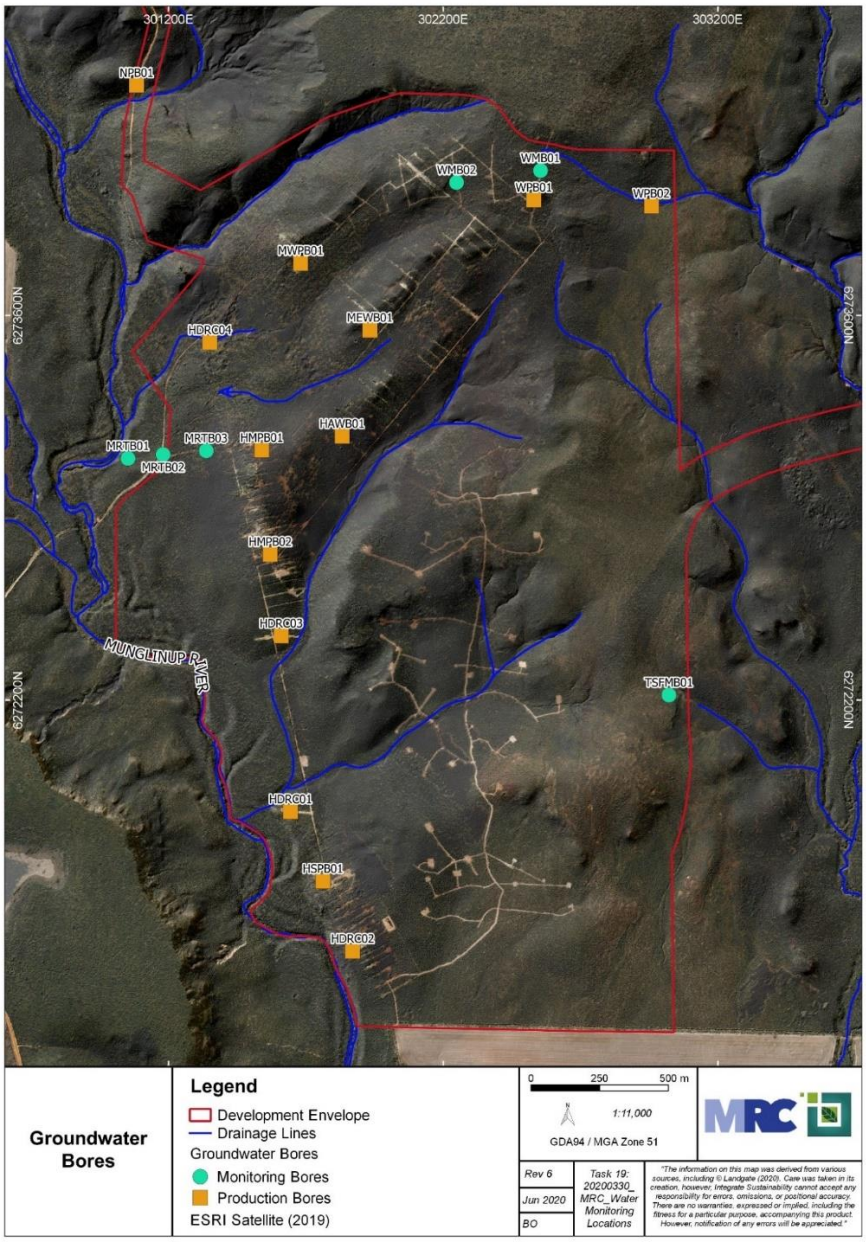


Figure 4-8 Hydrogeological Production and Monitoring Bores

The planned mining area mostly drains to the south-west towards the Munglinup River, which crosses the south-western corner of M74/245. At its closest point, the river is 40m from the planned Halberts South pit. There is minor drainage to the east towards Clayhole Creek, a tributary of Munglinup River. That river (the Munglinup River) is a tributary of the Oldfield River, which flows out to the Southern Ocean. During floods, there is likely to be localised movement of water from the Munglinup River into rocks and sediments on the riverbanks, but generally the river would be a locus of groundwater discharge through flow to the river, and evapotranspiration.

The relationship between groundwater and water in the Munglinup River can be seen in three cross-sections which extend from the mining area to the river (Figure 4-9). These use the available bore data and groundwater-level information to show the relationship between groundwater levels and the river, aquifer intervals, and vertical variations in electrical conductivity (salinity).

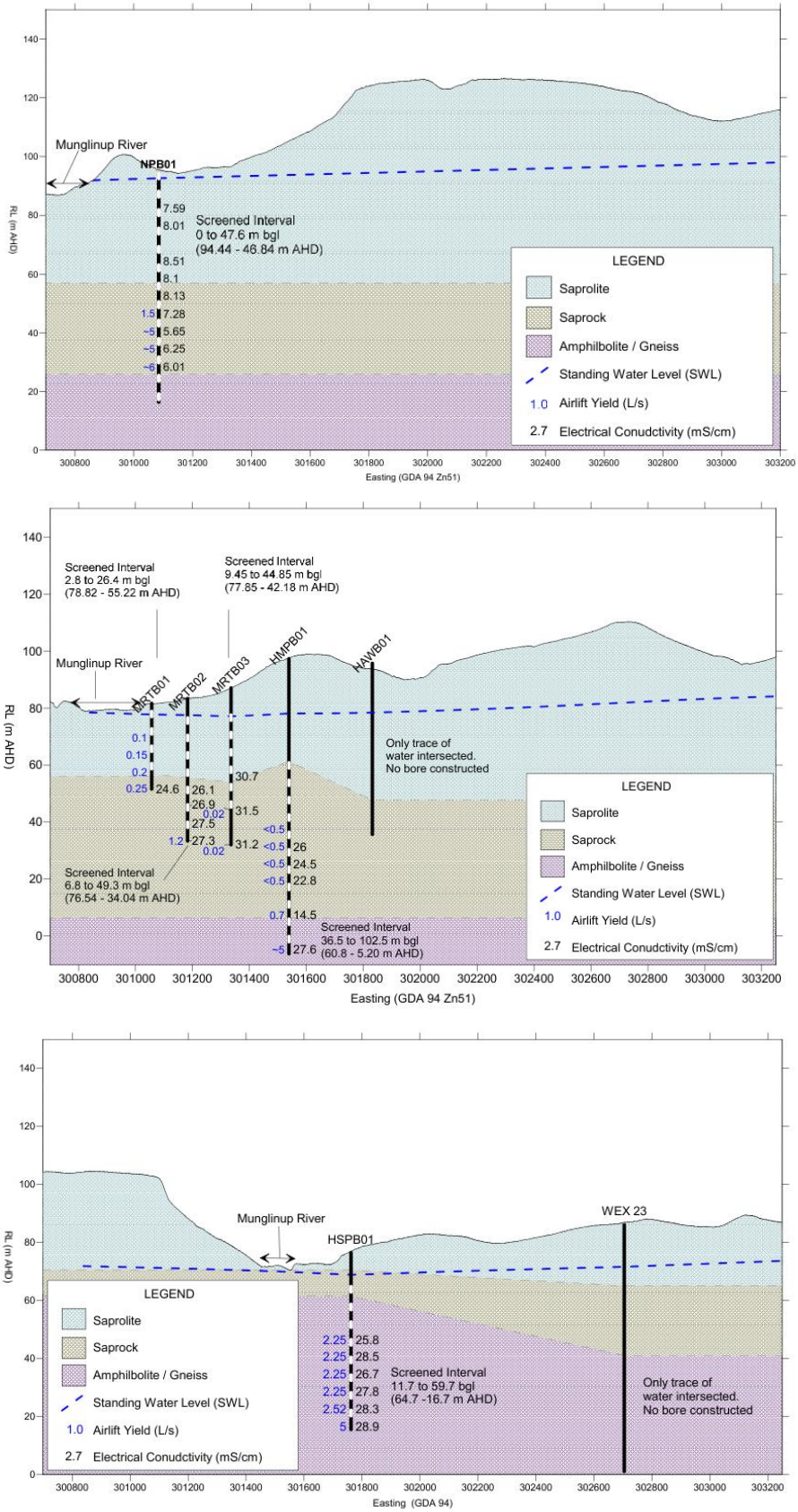


Figure 4-9 Groundwater Cross Sections (Rockwater, 2020b)

The groundwater drawdown modelling conducted by Rockwater (2020b) suggested that at the end of mining over a period of 15 years, groundwater-level drawdowns of at least 1m (Figure 4-10) could extend about 2km north, and 0.5km to 1.5km south of the mining area; 1 to 2km east to Clayhole Creek; and about 1.2km west to the assumed aquifer boundary. In reality, geological boundaries are likely to limit the extent of drawdowns further, particularly across-strike of the mining area to the east and west.

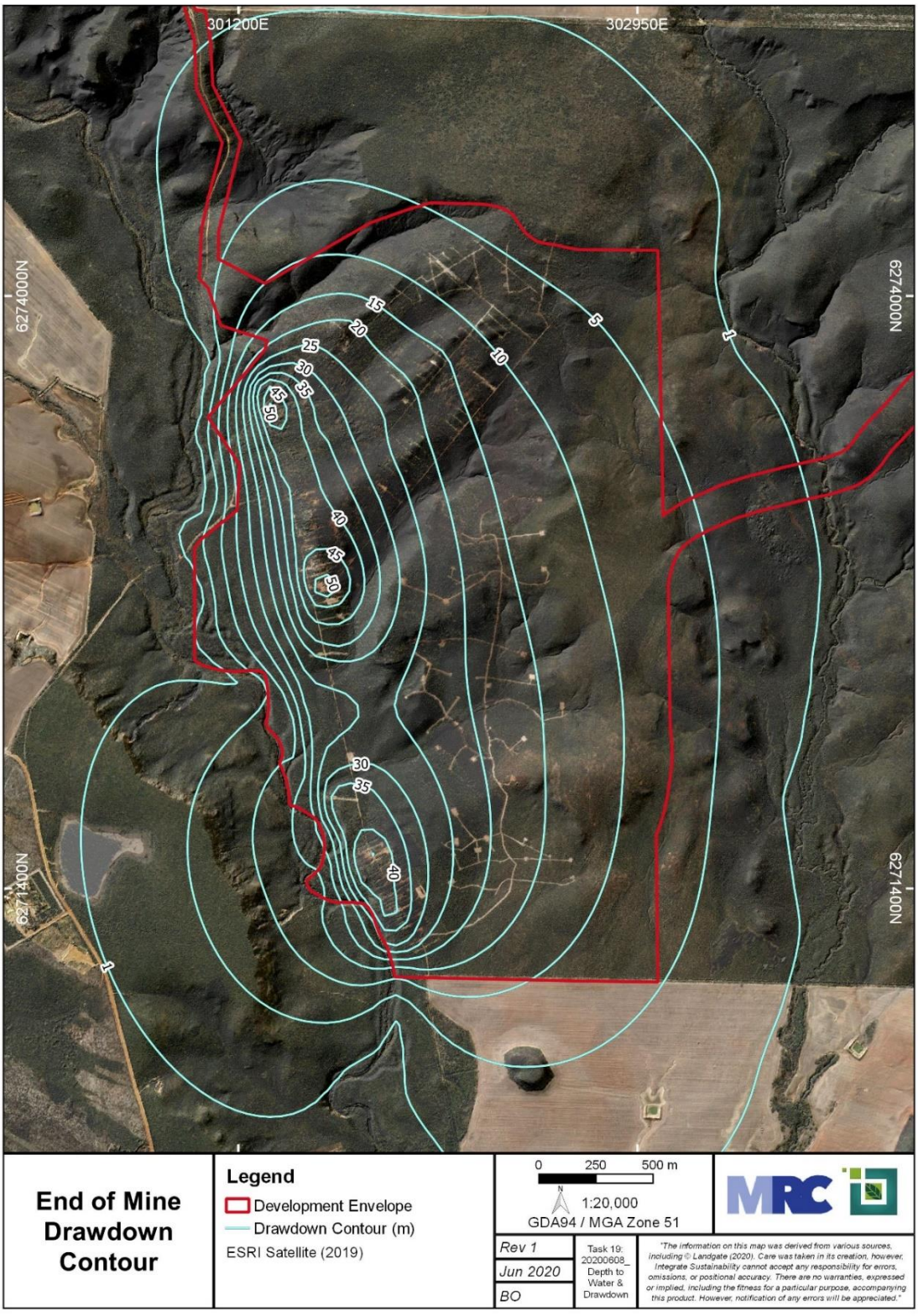


Figure 4-10 Mine Life Drawdown Contours

The Project area is within a zone where groundwater salinity on the Ravensthorpe Hydrogeological Sheet area is indicated to be within the range 7,000 to 35,000mg/L TDS, with salinities in the upper end of that range in and beneath alluvium along the Munglinup River (Johnson, 1998). Groundwater salinities from the Project's bores and the Munglinup townsite holes, and from the WIR database, generally range from 8,300 to 31,000mg/L TDS in accordance with the reported range above. In the Project bores, salinities range from 4,400 (NPB01) to 27,600 (TSFMB1) mg/L TDS, and except for NPB01 are 19,000mg/L TDS or higher. The low salinity at NPB01 is attributed to recharge from flows in the adjacent creek, a minor tributary to Munglinup River. There is evidence of increasing salinity with depth in some bores: in bore HDRC04, the salinity increased from 22,600mg/L at 20m depth to 24,500mg/L TDS at 66m (total depth); and in HSPB01 salinity increased with depth from 25,800 to 28,900mg/L TDS. Conversely, salinity decreased with depth in NPB01, with the lowest salinity in deeper, more-permeable zones (Rockwater, 2020b).

The analyses confirm that except at NPB01, the water is mostly highly saline (20,000 to 27,600mg/L TDS; 57% to 74% of sea-water), neutral to alkaline (pH 6.6 to 7.6), and of a sodium chloride type with elevated magnesium and sulphate. Metal concentrations were generally low or below reporting levels (nickel and copper were not analysed) except iron (up to 6.5mg/L) and manganese (up to 10.1mg/L). Nutrients (nitrogen and phosphorus) were at low concentrations (Rockwater, 2020b).

4.6 Flora and Vegetation

Studies examining the flora and vegetation of the Project commenced in 2014. The first field assessment was undertaken by Ecologia Environment in December 2014 with the final report produced in 2015 (Ecologia Environment, 2015). In 2018, Woodman Environmental was engaged to complete a peer review of the 2015 Ecologia report (Woodman Environmental, 2018a). Woodman Environmental determined additional field work was required to identify and survey potential habitat for threatened flora species and to clarify the distribution and extent of occurrence of the Proteaceae Dominated Kwongkan Shrublands Threatened Ecological Community (Kwongkan TEC). This would resolve discrepancies which occurred between 2018-2019 surveys along with a detailed spring flora and vegetation survey. The work provided additional data on the flora and vegetation across and beyond the development envelope, including updated vegetation community mapping (Woodman Environmental, 2019b)

In July 2019, the WA EPA requested MRC Graphite to undertake additional work; this work was to be competed and submitted before the EPA would formally assess the Project. It was indicated that the Woodman Environmental (2019b) flora and vegetation survey document would form the bases of the assessment, superseding historic survey report. The Woodman report was revised following the completion of additional field work.

The updated report is referred to as the Woodman Environmental Detailed Flora and Vegetation Assessment, 2020 (Woodman Environmental, 2020a) (Appendix C-3). In addition to this report, Woodman Environmental have also completed a desktop review of potential regional extent of vegetation units (Woodman Environmental, 2019a), and a Flora and Vegetation Impact Assessment Memo (Woodman Environmental, 2020b) (Appendix C-4).

4.6.1 Regional Flora

The Project lies within the Esperance Plain Bioregion and Recherche subregion (ESP2). The Recherche (ESP2) IBRA Subregion consists of vegetation types that are diverse and comprised of varying scrub, heath and woodland communities (Figure 4-11) (IBRA, 2001; Woodman Environmental, 2019b). Proteaceous scrubs and Mallee heaths are present on sandplains, herb fields and heaths occur on granite and quartzite ranges while Eucalypt woodlands predominantly occupy gullies and alluvial foot slopes (IBRA, 2001; Woodman Environmental, 2019b).

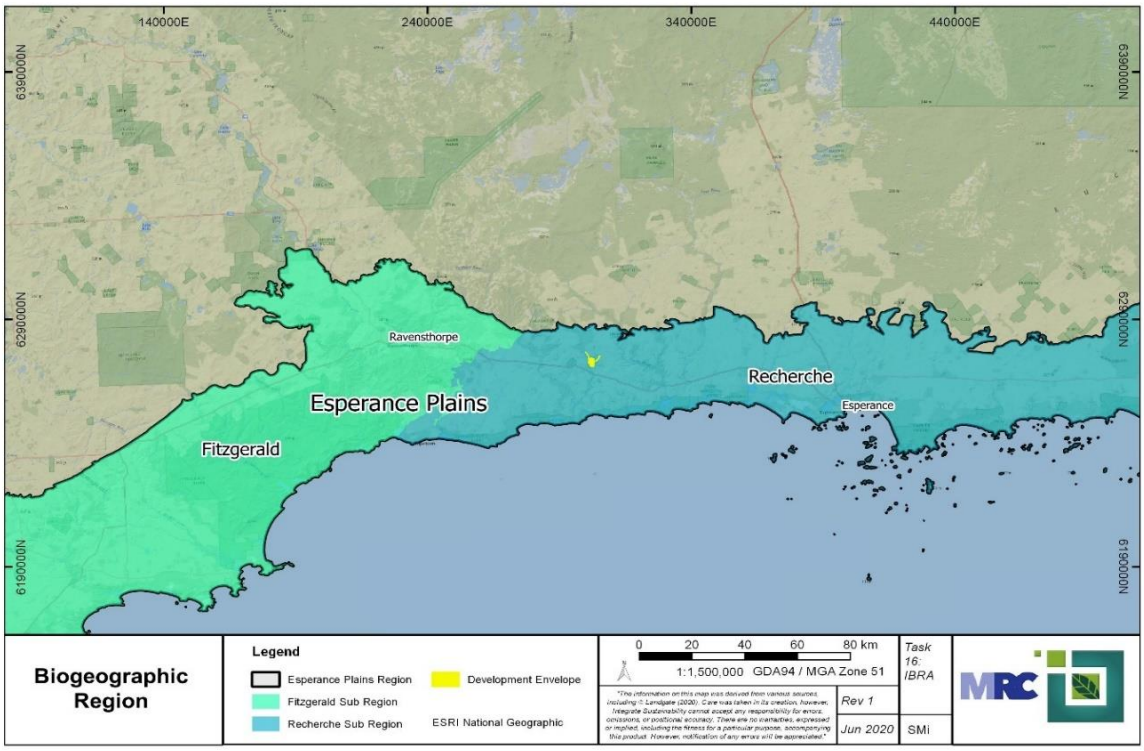


Figure 4-11 IBRA Bioregions

The Project is within Beard's South-West Botanical Province, this bioregion is equivalent to the Eyre Botanical District as defined by Beard (Beard, 1990). The vegetation of this IBRA region is characterised by a mallee heath formation on the predominant sand plains, with the most dominant mallee species being *Eucalyptus pleurocarpa* (Tallerack), and the heath understorey dominated by proteaceous and myrtaceous shrubs. (Beard, 1990; Cormer, et al., 2001).

Table 4-4 describes the four vegetation system associations that can be found within the Project area, visual representation of the vegetation associations is provided in Figure 4-12. Herb fields and heaths occur on granite tors and quartzite ranges that rise from the plains, while Eucalypt mallee and woodlands occur in gullies and alluvial foot-slopes (Beard, 1990; Cormer, et al., 2001). Thickets and scrub occur on dunes close to the coast, with thickets and heaths occurring in swampy areas. There are several large salt lakes on the plain (Beard, 1990).

Table 4-4 Vegetation System Associations found with the Baseline Survey Region
(Woodman Environmental, 2019b)

Vegetation System Association	Description	Current Extent (ha)	% of Pre-European Extent Remaining	% of Current Extent Protected for Conservation
Esperance 47	Shrublands; tallerack (*Eucalyptus pleurocarpa*) mallee-heath	61,386	14.9	11.2
Esperance 516	Shrublands; mallee scrub, black marlock (*Eucalyptus redunca* and allies)	46,651	40.7	9.7
Esperance 931	Medium woodland; yate (*Eucalyptus occidentalis*)	2,745	39.0	4.7
Esperance 4048	Shrublands; scrub-heath in the Esperance Plains including Mt Ragged scrubheath	2,927	15.9	12.9

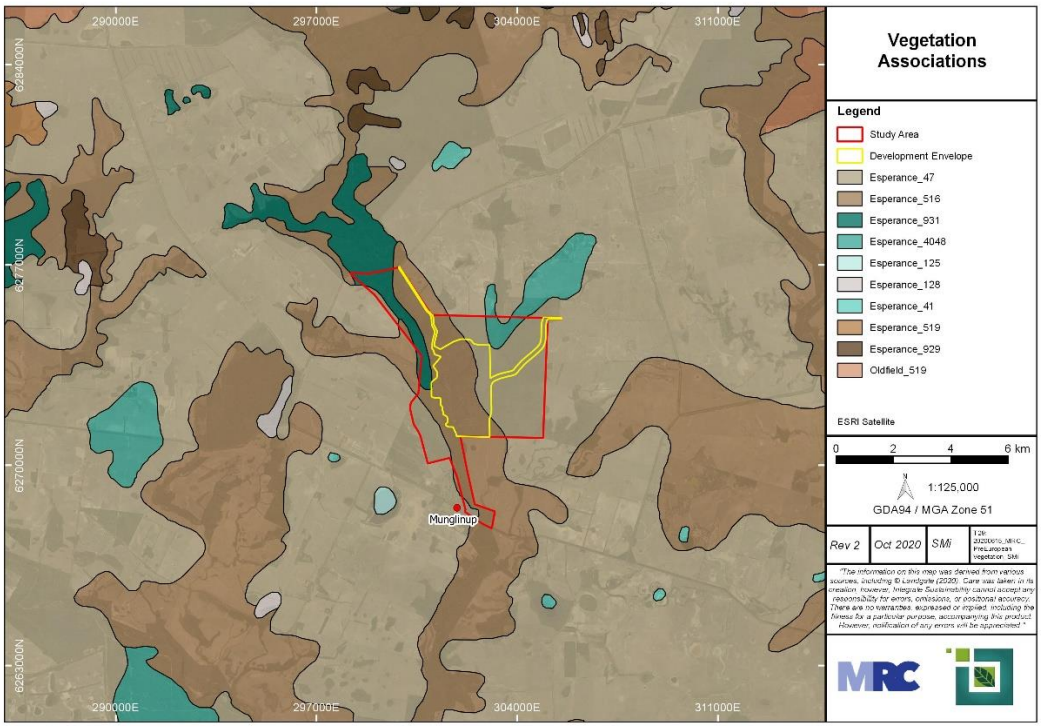


Figure 4-12 Project Region Vegetation System Associations

An interrogation by Woodman Environmental (Woodman Environmental, 2020a) of the available State and Commonwealth databases returned a total of 103 significant vascular flora taxa that have records in the 40km buffered Desktop Study Area. This includes 16 Threatened taxa (under the BC Act) and 91 DBCA-classified Priority flora. Of these Threatened and Priority species, seven are found within the Study Area. Figure 4-13 shows the regional extent of these seven species using publicly available information from Naturebase and WA Herbarium.

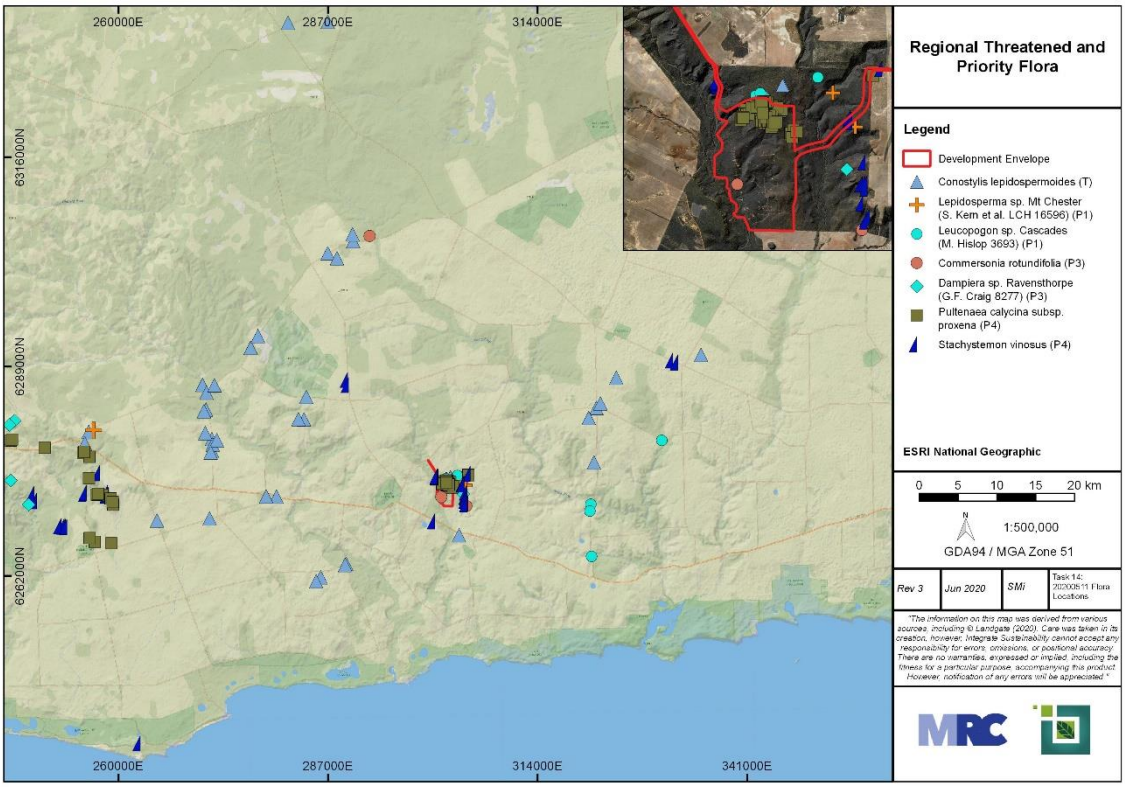


Figure 4-13 Regional occurrence of threatened and priority Flora recorded during Baseline Surveys

Woodman Environmental completed a likelihood of occurrence assessment for these threatened flora taxa (Woodman Environmental, 2020a). The likelihood of occurrence have been listed as 'Possible' or 'Unlikely' based on an overview of all the existing information (Woodman Environmental, 2020a) (Table 4-5). The only threatened flora discovered during the Woodman 2020 survey, within the Study Area was the *Conostylis lepidospermoides,* however its likelihood of occurrence within the development envelope was recorded as unlikely.

Table 4-5 Threatened Flora Known Taxa within the Desktop Study Area
(Woodman Environmental, 2020a)

Taxon	Status	Flowering Period	Habitat	Likelihood of Occurrence
Acrotriche orbicularis	T	July, October	Grey to brown clay loam. Magnesite. Hill slopes and rises.	Unlikely
Anigozanthos bicolor subsp. *minor*	T	August - October	Sand, often with granite. Well-watered sites. Sandplains, hills.	Unlikely
Beyeria cockertonii	T	May, October	Clay with komatiite fragments. Hills and slopes.	Unlikely
Conostylis lepidospermoides	T	September - October	Grey or yellow-brown sand over laterite. Undulating plains.	Recorded in Study Area Unlikely in Development envelope
Eremophila denticulata subsp. *denticulata*	T	August – December, January – February	Alluvium, sand, sandy clay loam. Riverbeds and plains, laterite breakaways.	Unlikely
Eremophila lactea	T	September - November	White sandy clay loam often with limestone. Flats and undulating plains.	Unlikely
Eremophila subteretifolia	T	November – December	Grey sand, loam. Edges of salt lakes, sub-saline flats.	Unlikely
Eucalyptus purpurata	T	November	White powdery loam, magnesite. Eastern and north-eastern slopes of ridges.	Unlikely
Hibbertia abyssus	T	September - November	Sandy loam/clay with laterite. Rocky hills and breakaways.	Unlikely
Hypocalymma sp. Cascade (R. Bruhn 20896)	T	August	Sandy loam sometimes with granite. Undulating plains and gentle slopes.	Unlikely
Kennedia glabrata	T	August – November	Soil pockets, sandy soils. Granite outcrops.	Unlikely
Kunzea similis subsp. *mediterranea*	T	September – October	Grey loamy sand over laterite. Ridge tops.	Unlikely
Lambertia echinata subsp echinata	T	September – October	Gravelly sandy loam, brown sandy loam, white-grey sand, granite, laterite. Below and between rock outcrops, slopes, hill crests.	Unlikely
Rhizanthella johnstonii	T	June - July	Under *Melaleuca uncinata/ hamata* mallee heath (DBCA 2010) in sandy clay soil.	Unlikely
Ricinocarpos trichophorus	T	May, August – September	Sandy clay, loam. Breakaways, among sandstone rocks.	Unlikely
Roycea pycnophylloides	T	September	Sandy soils, clay. Saline flats.	Unlikely

4.6.2 Local Flora Communities

Much of the vegetation surrounding the Project area has been historically cleared for farming and agriculture with patches of vegetation remaining along the river systems of the region.

During the 2018-2020 surveys (Woodman Environmental, 2020a) seventeen vegetation units (VU) were described (Table 4-7) and mapped (Figure 4-14) within the Project area, the majority of vegetation units are mallee woodlands. The VUs belong to two broad vegetation groups:

> Group 1: Mallee woodlands or tall and mid shrublands on elevated plains with predominantly sandy soils and laterite at or near the surface (VUs 16 and 17); and
>
> Group 2: Mallee woodlands, woodlands or tall to mid shrublands on eroded valley slopes and floors with predominantly clay soils (VUs 1-15).

During the 2020 Woodman study, a targeted survey of the region surrounding the Study Area was undertaken to identify VUs defined and mapped within the Study Area. The survey was conducted from the 3rd – 6th March 2020. Prior to the survey, the descriptions of each VU were reviewed, along with indicator and common taxa, to allow for occurrences of VUs to be confidently diagnosed in the field.

The aim of the study was to extend the mapping of VU polygons beyond the core Study Area and to locate probable locations of specific VUs within the wider region. The extension of VU mapping polygons into areas immediately adjacent to the Study Area considered all Study Area VUs, while targeted survey in the wider region considered only specific VUs whose occurrences were primarily located within the Development envelope (Woodman Environmental, 2020a). The total areas of each of the VUs of all mapped areas are presented in Figure 4-14 and Table 4-6.

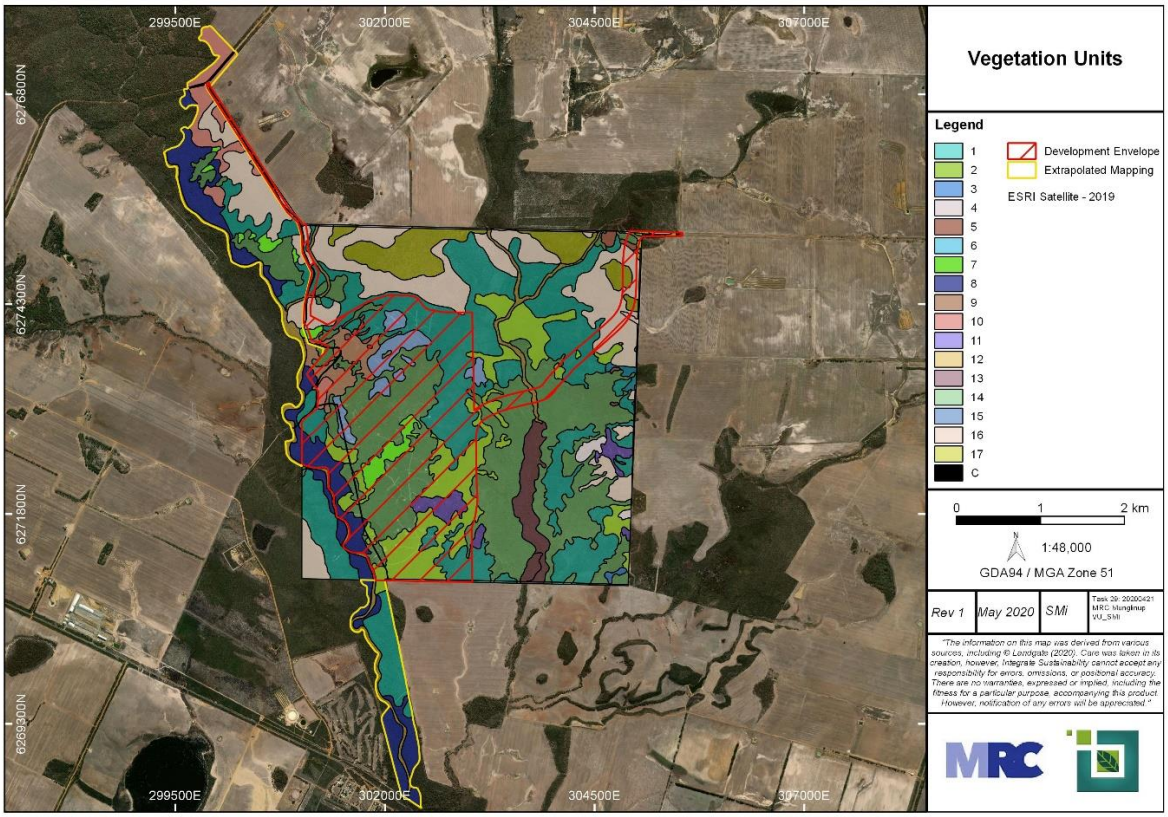


Figure 4-14 Project Area Vegetation Units

It is worthy to note that a number of VUs mapped in the Study Area occur on small, sedimentary outcrops (referred to as 'sandstone'), and are represented by only one or a few quadrats (VUs 3, 4, 6 and 7). Although some of these VUs are similar to each other according to the classification analysis,

and could arguably be combined into fewer, more broadly-defined VUs, the differences in composition are considered enough, to recognise them as distinct VUs (Woodman Environmental, 2020a).

Table 4-6 Areas of Vegetation Units Mapped within the Study Area

Vegetation Unit	Area Mapped (ha)	Extrapolated Area (ha)	Total Study Area (ha)
1	445.1	69.3	514.4
2	183.4	1.8	185.2
3	1.9	0.0	1.9
4	7.2	0.0	7.2
5	7.5	0.0	7.5
6	4.6	0.0	4.6
7	19.9	7.8	27.7
8	42.7	90.6	133.3
9	32.0	3.7	35.7
10	7.1	41.6	48.7
11	26.4	0.0	26.4
12	26.9	31.8	58.7
13	41.6	0.0	41.6
14	465.3	30.1	495.4
15	40.2	0.0	40.2
16	226.9	57.8	284.7
17	89.3	0.0	89.3

In the context of vegetation that is significant for reasons other than formal listing (as per EPA 2016a, b), VUs 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 15 are all considered to be significant in a local context (Woodman Environmental, 2020b). All have restricted distributions in the Project Area (all occupy less than 3 % of the Project Area), as they occur on landforms that are uncommon in the Study Area (sandstone breakaways, dolerite and granite outcrops, drainage lines and associated flats); as 'restricted distribution' is one of the criteria that the EPA uses when determining whether vegetation is significant, this is in line with EPA guidance (EPA, 2016b). The VUs 1, 2 and 14, are widespread in the Study Area, and are not considered to be locally significant.

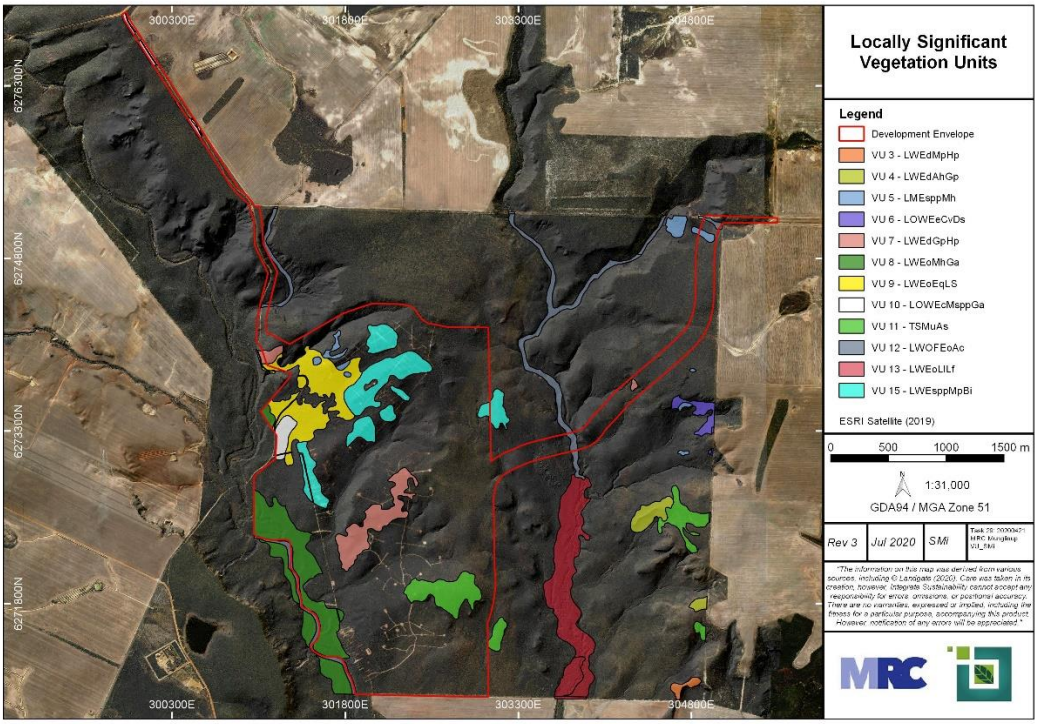


Figure 4-15 Locally Restricted Vegetation Units

In a regional context, as a precaution, it is considered that all locally important VUs are potentially regionally significant. They all have potentially restricted distributions, and have potentially been historically impacted by threatening processes; this is in line with EPA guidance (EPA, 2016b). Their restricted distributions and degree of historical impact are a result of the significant amount of historical clearing for agriculture that has been undertaken in the vicinity of Munglinup, with vegetation restricted to isolated remnants; additionally, some of the VUs may potentially have had naturally restricted distributions. This inherently limits the potential extent of all VUs, as remnant vegetation as a whole is limited in extent. This is also reflected by the current extent of the vegetation system associations mapped over the Project Area, which have all been significantly reduced from their pre-European extent (see Section 5.1.3). The VUs that occur on restricted landforms in particular, have an increased probability of being significant because of this factor, as they are inherently naturally rare.

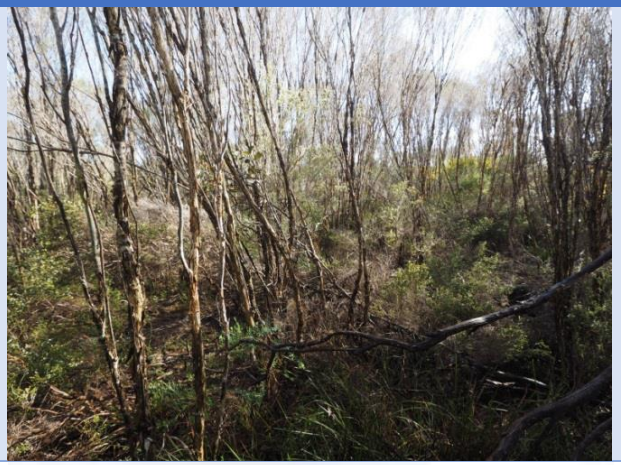
Targeted searching within the surrounding region was conducted for a number of VUs mapped in the Project Area whose occurrences were primarily located within the Development envelope. Several of the target VUs (2, 7, 8 and 9) were located immediately adjacent, with polygons of these VUs mapped via extrapolation (Woodman Environmental, 2020a). For the majority of target VUs, searching in the wider region surrounding the Project identified locations of vegetation that likely represent VUs in a local context. In the case of VU 2, and to a lesser extent VU 11, these occurrences appear to be extensive. VU 2 occurs on landforms not considered to be regionally restricted (low hills and valley slopes) and was therefore expected to occur elsewhere in the region.

The targeted survey was unsuccessful in locating any further occurrences of vegetation that potentially represents VU 15 in a local context (high floristic similarity), with one area identified as potentially representing this VU in a regional context (similar landform and soil association and comprising similar dominant flora). This was not unexpected, given the unusual substrate and soils on which this VU occurs. Similarly, only one occurrence of vegetation that potentially represents VU 9 in a local context was located in the wider region; this occurrence likely represents this VU in a regional context. However, VU 9 was also mapped by extrapolation outside the survey Area, however, this was over a very small area. The results of the targeted search are summarised in Table 4-8.

Table 4-7 Vegetation Units of the Munglinup Graphite Project

VU	Code	Vegetation Description	Image
1	LWEsppMr	Low mallee woodland to open woodland of mixed species including *Eucalyptus leptocalyx* subsp. *leptocalyx*, *Eucalyptus flocktoniae* subsp. *flocktoniae*, *Eucalyptus uncinata*, *Eucalyptus suggrandis* subsp. *suggrandis* and *Eucalyptus phaenophylla* subsp. *interjacens* over tall to mid shrubland of mixed species usually dominated by *Melaleuca rigidifolia* and occasionally *Melaleuca subfalcata*, *Melaleuca calycina* and *Melaleuca lateriflora* over low open to sparse shrubland of mixed species including *Grevillea oligantha*, *Daviesia articulata*, *Daviesia lancifolia*, *Hibbertia pungens* and *Grevillea pectinata* over low sparse sedgeland of mixed species dominated by *Gahnia ancistrophylla*, *Gahnia aristata* and *Tetraria* sp. Mt Madden (C.D. Turley 40 BP/897) on red-brown, orange-brown or grey-brown clay loam, usually with ironstone, sandstone or mixed colluvial gravel, on upper to mid slopes of valleys and low hills.	
2	LWEsppMspp	Low mallee woodland to open woodland of mixed species including *Eucalyptus flocktoniae* subsp. *flocktoniae*, *Eucalyptus leptocalyx* subsp. *leptocalyx*, *Eucalyptus suggrandis* subsp. *suggrandis*, *Eucalyptus conglobata* subsp. *conglobata* and *Eucalyptus phaenophylla* subsp. *interjacens* over tall to mid shrubland to open shrubland of mixed species dominated by *Melaleuca hamata*, *Melaleuca sapientes*, *Melaleuca lateriflora*, *Daviesia aphylla* and *Melaleuca undulata* over low open to sparse shrubland of mixed species including *Acacia ingrata*, *Grevillea pectinata*, *Aotus* sp. Southern Wheatbelt (C.A. Gardner & W.E. Blackall 1412), *Hibbertia psilocarpa* and *Chorizema nervosum* over low open sedgeland of mixed species dominated by *Gahnia ancistrophylla*, *Tetraria* sp. Mt Madden (C.D. Turley 40 BP/897), *Gahnia aristata* and *Lepidosperma gahnioides* on red-brown to brown clay loam, usually with ironstone, sandstone or mixed colluvial gravel, on slopes valleys and low hills.	

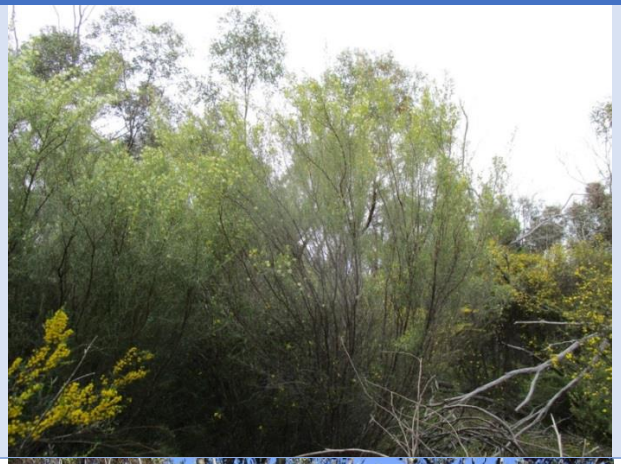
VU	Code	Vegetation Description	Image
3	LWEdMpHp	Low mallee woodland dominated by *Eucalyptus densa* subsp. *densa* over tall shrubland dominated by *Melaleuca pentagona* var. *pentagona* and *Banksia media* over low sparse shrubland dominated by *Hibbertia pungens* on skeletal light brown clay loam with sandstone stones over sandstone outcropping on breakaways and ridges.	
4	LWEdAhGp	Low mallee woodland of *Eucalyptus densa* subsp. *densa* over tall sparse shrubland dominated by *Acacia harveyi* and *Hakea laurina* over mid shrubland dominated by *Gastrolobium parviflorum* and *Melaleuca thapsina* over low shrubland dominated by *Dampiera* sp. Ravensthorpe (G.F. Craig 8277) (P3) on skeletal brown sandy loam with sandstone stones over sandstone outcropping on breakaways and ridges.	

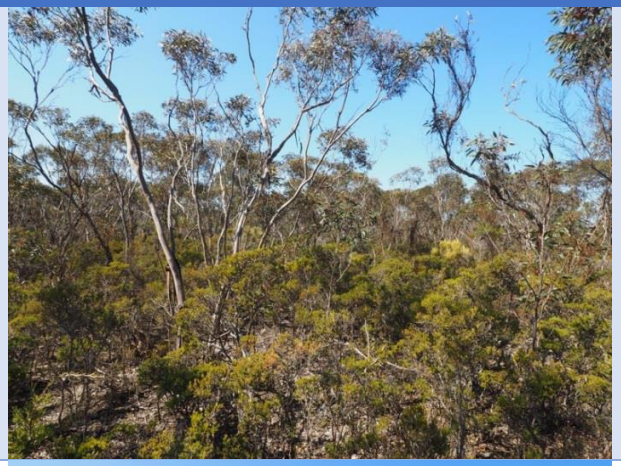
VU	Code	Vegetation Description	Image
5	LMEsppMh	Low isolated mallees of mixed species including *Eucalyptus conglobata* subsp. *conglobata* and *Eucalyptus phaenophylla* subsp. *interjacens* over tall Shrubland dominated by *Melaleuca hamata*, *Calothamnus quadrifidus* subsp. *quadrifidus*, *Melaleuca elliptica* and occasionally *Allocasuarina campestris* over mid to low open shrubland of mixed species dominated by *Astus tetragonus*, *Leucopogon cuneifolius*, *Philotheca gardneri* subsp. *gardneri* and occasionally *Hybanthus floribundus* subsp. *adpressus* and *Grevillea anethifolia* over low open sedgeland of mixed species dominated by *Tetraria* sp. Mt Madden (C.D. Turley 40 BP/897), *Lepidosperma sanguinolentum*, *Lepidosperma* sp. Ravensthorpe (G.F. Craig 5188), *Lepidosperma* sp. 'Jerdacuttup (R.L. Barrett RLB 2770)' and *Gahnia aristata* on dark brown to brown clay loam with dolerite gravel and dolerite outcropping on upper and mid slopes of valleys.	
6	LOWEeCvDs	Low open mallee woodland of mixed species dominated by *Eucalyptus ecostata* and *Eucalyptus pleurocarpa* over tall to mid shrubland of mixed species dominated by *Calothamnus villosus*, *Melaleuca hamata*, *Kunzea affinis*, *Acacia sulcata* var. *platyphylla* and *Melaleuca rigidifolia* over low sparse shrubland of mixed species dominated by *Darwinia* sp. Lake Cobham (K. Newbey 3262), *Leucopogon* sp. Newdegate (M. Hislop 3585), *Hemigenia teretiuscula*, *Philotheca gardneri* subsp. *gardneri* and *Calytrix leschenaultii* over low open sedgeland of mixed species dominated by *Lepidosperma sanguinolentum*, *Lepidosperma* ?sp. Mt Short (S. Kern et al. LCH 17510) (P1), *Lepidosperma rigidulum* and *Lepidosperma* sp. 'Jerdacuttup (R.L. Barrett RLB 2770)' on brown sandy loam with sandstone gravel and stones and occasional sandstone outcropping on breakaways and ridges.	

VU	Code	Vegetation Description	Image
7	LWEdGpHp	Low mallee woodland to open forest dominated by *Eucalyptus densa* subsp. *densa* and occasionally *Eucalyptus flocktoniae* subsp. *flocktoniae* and *Eucalyptus phaenophylla* subsp. *interjacens* over tall to mid open shrubland of mixed species dominated by *Gastrolobium parviflorum*, *Calothamnus quadrifidus* subsp. *quadrifidus*, *Hakea lissocarpha* and occasionally *Melaleuca hamata* over low sparse shrubland of mixed species including *Hibbertia pungens*, *Hibbertia gracilipes* and *Lasiopetalum rosmarinifolium* over low sedgeland and forbland of mixed species including *Tetraria* sp. Mt Madden (C.D. Turley 40 BP/897), *Lepidosperma* sp. Ravensthorpe (G.F. Craig 5188), *Lepidosperma* sp. Bandalup Scabrid (N. Evelegh 10798), *Lepidosperma* sp. 'Jerdacuttup (R.L. Barrett RLB 2770)' and *Stylidium albomontis* on red-brown or light brown sandy loam with sandstone gravel and sandstone outcropping on breakaways and ridges.	
8	LWEoMhGa	Low woodland of *Eucalyptus occidentalis* over tall open to sparse shrubland dominated by *Melaleuca hamata* and *Acacia cyclops* over mid open to sparse shrubland of mixed species including *Hakea lissocarpha*, *Melaleuca glaberrima* and *Hakea nitida* over low sparse Shrubland of mixed species including *Lasiopetalum rosmarinifolium*, *Hibbertia gracilipes*, *Dodonaea caespitosa* and *Thomasia angustifolia* over low open to sparse sedgeland and rushland of mixed species dominated by *Gahnia ancistrophylla*, *Lepidosperma* sp. Bandalup Scabrid (N. Evelegh 10798), *Lepidobolus preissianus*, *Lomandra micrantha* subsp. *teretifolia* and *Lepidosperma sanguinolentum* over low sparse forbland and grassland of mixed species including *Neurachne alopecuroidea*, *Chamaescilla corymbosa* var. *corymbosa*, *Goodenia affinis*, *Oxalis exilis* and *Lagenophora huegelii* on orange-brown clay or sandy loam on river flats.	

VU	Code	Vegetation Description	Image
9	LWEoEqLs	Low woodland of *Eucalyptus occidentalis* over low open mallee woodland of *Eucalyptus quadrans* over tall to mid open to sparse shrubland of mixed species including *Acacia glaucoptera*, *Hakea lissocarpha*, *Acacia cyclops*, *Melaleuca acuminata* subsp. *acuminata* and *Acacia verriculum* over low sparse shrubland of mixed species including *Thomasia foliosa*, *Dodonaea caespitosa* and *Phyllanthus calycinus* over low open to sparse sedgeland of mixed species dominated by *Lepidosperma* sp. Ravensthorpe (G.F. Craig 5188), *Tetraria* sp. Mt Madden (C.D. Turley 40 BP/897) and *Lomandra effusa* over low sparse forbland of mixed species including *Lysimachia arvensis*, *Chamaescilla corymbosa* var. *corymbosa*, *Goodenia affinis*, *Oxalis exilis* and *Plantago hispida* on brown clay loam with quartz gravel on valley slopes.	
10	LOWEcMsppGa	Low open mallee woodland dominated by *Eucalyptus conglobata* subsp. *conglobata* and occasionally *Eucalyptus phaenophylla* subsp. *interjacens* over tall to mid shrubland to open shrubland of mixed species dominated by *Melaleuca hamata* and *Melaleuca lateriflora*, and occasionally *Melaleuca glaberrima*, *Santalum acuminatum* and *Acacia cyclops*, over low sparse shrubland of mixed species including *Lasiopetalum rosmarinifolium*, *Dodonaea caespitosa* and *Hakea lissocarpha* over low open to sparse sedgeland, forbland and rushland of mixed species dominated by *Gahnia ancistrophylla*, *Tetraria* sp. Mt Madden (C.D. Turley 40 BP/897), *Lepidosperma* sp. Carracarrup Creek (S. Kern, R. Jasper, D. Brassington LCH 16738), *Lepidobolus preissianus* and *Opercularia vaginata* on red-brown or brown clay loam with dolerite and occasionally quartz stones on valley flats and slopes.	

VU	Code	Vegetation Description	Image
11	TSMuAs	Tall to mid open to sparse shrubland dominated by *Melaleuca uncinata* over mid to low shrubland to open shrubland of mixed species dominated by *Acacia sulcate* var. *platyphylla*, *Melaleuca elliptica* and *Astus tetragonus* over low sparse shrubland of mixed species including *Leptospermum oligandrum* and *Styphelia* sp. Cascades (R. Davis 11037) on brown clayey sand or clay loam with granite and quartz stones and often granite outcropping on low rises and slopes.	
12	LWOFEoAc	Low woodland to open forest dominated by *Eucalyptus occidentalis* and *Melaleuca cuticularis* over tall open shrubland of mixed species dominated by *Acacia cyclops*, *Acacia saligna* subsp. *lindleyi* and *Labichea lanceolate* subsp. *brevifolia* over low open to sparse sedgeland of mixed species including *Chorizandra enodis*, *Gahnia trifida* and *Juncus pallidus* over occasional low sparse chenopod shrubland dominated by *Salicornia quinqueflora* subsp. *quinqueflora*, *Suaeda australis* and *Disphyma crassifolium* subsp. *clavellatum* over low sparse forbland of mixed species including *Cotula australis* and **Cotula coronopifolia* on grey-brown to clay or clay loam in narrow drainage line channels.	

VU	Code	Vegetation Description	Image
13	LWEoLlLf	Low woodland dominated by *Eucalyptus occidentalis* over tall to mid shrubland to closed shrubland of mixed species dominated by *Labichea lanceolata* subsp. *brevifolia*, *Acacia cyclops*, *Acacia sulcata* var. *platyphylla* and *Grevillea anethifolia* over low sparse shrubland of mixed species including *Thomasia angustifolia* and *Thomasia foliosa* over low sparse sedgeland dominated by *Lepidosperma fimbriatum* and *Lepidosperma* sp. Bandalup Scabrid (N. Evelegh 10798) over low sparse forbland of mixed species including *Dichondra repens*, *Cotula australis* and *Oxalis exilis* on yellow-brown to light brown sand or sandy clay in broad drainage lines and adjacent flats.	
14	LFEpMtAg	Low open mallee forest dominated by *Eucalyptus platypus* subsp. *platypus* and occasionally *Eucalyptus dielsii* and *Eucalyptus extensa* over tall sparse Shrubland of mixed species dominated by *Melaleuca torquata*, *Melaleuca cucullata*, *Melaleuca acuminata* subsp. *acuminata*, *Acacia cyclops* and *Exocarpos sparteus* over low sparse shrubland of mixed species dominated by *Acacia glaucoptera* and *Exocarpos aphyllus* over low sparse grassland dominated by *Rytidosperma setaceum* on grey, light brown or brown clay, clay loam or sandy clay with colluvial stones (frequently sandstone, quartz, ironstone and laterite) on valley slopes and flats and undulating plains.	

VU	Code	Vegetation Description	Image
15	LWEsppMpBi	Low mallee woodland dominated by *Eucalyptus flocktoniae* subsp. *flocktoniae*, *Eucalyptus conglobate* subsp. *conglobata* and *Eucalyptus indurata* over tall to mid shrubland dominated by *Melaleuca pauperiflora* subsp. *pauperiflora* and occasionally *Choretrum glomeratum*, *Dodonaea stenozyga* and *Pultenaea calycina* subsp. *proxena* (P4) over low shrubland dominated by *Boronia inornata* subsp. *inornata* on grey or grey-brown clay loam with calcareous stones on low rises on undulating plains.	
16	LWEpBaMs	Low mallee woodland dominated by *Eucalyptus pleurocarpa* and occasionally *Eucalyptus uncinata* over mid to low shrubland of mixed species dominated by *Banksia armata* var. *ignicida, Banksia alliacea*, *Banksia obovata, Beaufortia micrantha* and *Leucopogon* sp. Newdegate (M. Hislop 3585) over low open to sparse sedgeland of mixed species dominated by *Mesomelaena stygia* subsp. *stygia*, *Lepidosperma* sp. 'Clathrate (R.L. Barrett & G.F. Craig RLB 3570)', *Caustis dioica*, *Lepidosperma carphoides* and *Lepidobolus chaetocephalus* on grey-yellow, yellow-brown or greybrown sandy or clay loam with lateritic gravel on undulating plains.	

VU	Code	Vegetation Description	Image
17	TSLiAcCd	Tall open to sparse shrubland dominated by *Lambertia inermis* var. *inermis* and occasionally *Nuytsia floribunda* over mid shrubland to open shrubland of mixed species dominated by *Adenanthos cuneatus*, *Allocasuarina humilis*, *Banksia baueri*, *Taxandria spathulata* and *Chamelaucium megalopetalum* over low shrubland of mixed species including *Conothamnus aureus*, *Petrophile teretifolia, Eutaxia inuncta*, *Jacksonia viscosa* and *Hibbertia gracilipes* over low sedgeland and rushland of mixed species dominated by *Caustis dioica*, *Chordifex sphacelatus, Hypolaena fastigiata, Lepidobolus chaetocephalus* and *Lyginia imberbis* on grey-brown sand, occasionally with laterite gravel, on undulating plains.	

Table 4-8 Summary of Results of Regional Targeted Survey for Study Area Vegetation Units

VU	Mapped Outside Study Area via Extrapolation	Location (Including Tenure) of Potential Occurrences in Wider Region	Relationship of Regional Locations to VUs	Possible Extent of Occurrence
2	Yes – 1.8ha (extension of Study Area VU polygon).	Location 1 – Crown Land (Shire of Ravensthorpe) (Uncleared), Munglinup River Corridor, Rawlinson Road (10km north-west of Study Area).	Likely representative in a local and regional context: indicator taxa *Eucalyptus leptocalyx*, *Grevillea pectinata* and *Coopernookia polygalacea*, and characteristic taxa *Eucalyptus flocktoniae, Eucalyptus suggrandis, Daviesia aphylla*, *Melaleuca hamata*, *Melaleuca sapientes* and *Melaleuca lateriflora* widespread and relatively common at note points; soils and substrate (clay with mixed gravels) present.	Appears relatively extensive – present as two large patches that are approximately 150m wide and extend approximately 300m north of Rawlinson Road to the Munglinup River and apparently connect; further patches appear to be present in vicinity based on aerial photograph interpretation.
		Location 2 – Crown Land (Shire of Ravensthorpe) (Uncleared) and Parkland Reserve, Munglinup River Corridor, Rawlinson Road (10km north-west of Study Area).	Likely representative in a local and regional context: indicator taxa *Eucalyptus leptocalyx*, *Grevillea pectinata* and *Coopernookia polygalacea*, and characteristic taxa *Eucalyptus flocktoniae, Eucalyptus suggrandis, Daviesia aphylla*, *Melaleuca hamata*, *Melaleuca sapientes* and *Melaleuca lateriflora* widespread and relatively common at note points; soils and substrate (clay with mixed gravels) present.	Appears relatively extensive – present as two large patches that are broken by the Munglinup River, patches extend for several hundred metres either side of the river and at least 200m north of Rawlinson Road. Further patches appear to be present in vicinity based on aerial photograph interpretation.
		Location 3 – Crown Land (Shire of Ravensthorpe) (Uncleared) and Parkland Reserve, Munglinup River Corridor, Rawlinson Road (10km north-west of Study Area).	Likely representative in a local and regional context: indicator taxa *Eucalyptus leptocalyx*, *Grevillea pectinata* and *Coopernookia polygalacea*, and characteristic taxa *Eucalyptus flocktoniae, Eucalyptus suggrandis, Daviesia aphylla*, *Melaleuca hamata*, *Melaleuca sapientes* and *Melaleuca lateriflora* widespread and relatively common at note point; soils and substrate (clay with mixed gravels) present.	Appears relatively extensive – extends for at least 200m either side of Rawlinson Road, and appears to extend a relatively large distance further south.
		Location 4 – Parkland Reserve, Young River Corridor, near Mills Road crossing (10km north-east of Study Area).	Likely representative in a local and regional context: indicator taxa *Eucalyptus leptocalyx*, *Grevillea pectinata* and *Coopernookia polygalacea*, and characteristic taxa *Eucalyptus flocktoniae, Eucalyptus suggrandis, Daviesia aphylla*, *Melaleuca undulata*, *Melaleuca hamata* and *Gahnia ancistrophylla* widespread and relatively common at note point; soils and substrate (clay with mixed gravels) present.	Possibly extensive – occurs as a mosaic with vegetation that appears similar to VU 1, but unclear as to how far north and south of road this vegetation extends.
7	Yes – 7.8ha (several small polygons).	Location 1 – Parkland Reserve, Munglinup River Corridor, just north of Mills Road (2km north-west of Study Area).	Likely representative in a local and regional context: characteristic taxa *Eucalyptus flocktoniae*, *Eucalyptus conglobata*, *Gastrolobium parviflorum*, *Calothamnus quadrifidus*, *Hakea lissocarpha* and *Melaleuca hamata* widespread and relatively common at note point; soils and substrate (sandy loam with sandstone gravel over sandstone outcropping) present.	NA

VU	Mapped Outside Study Area via Extrapolation	Location (Including Tenure) of Potential Occurrences in Wider Region	Relationship of Regional Locations to VUs	Possible Extent of Occurrence
8	Yes – 90.6ha (mostly extensions of Study Area VU polygons).	None located.	NA	NA
9	Yes – 3.7ha (extension of Study Area VU polygon).	Location 1 – Parkland Reserve, Munglinup River Corridor, just north of Mills Road (2km north-west of Study Area).	Possibly representative in a local context; likely representative in a regional context: indicator taxon *Acacia glaucoptera*, and characteristic taxa *Eucalyptus occidentalis, Acacia cyclops*, *Phyllanthus calycinus*, *Lomandra effusa* and *Lepidosperma* sp. Ravensthorpe (G.F. Craig 5188) widespread and relatively common at note points; soils and substrate (clay) present. However, VU is very similar to VU 9 (both VUs likely represent the same vegetation type in a regional context), with some indicator and characteristic taxa from this VU present (*Lomandra micrantha* subsp. *teretifolia*, *Thomasia angustifolia*); many indicator taxa are also annual taxa which were not present because of survey timing.	Possibly extensive – appears to extend north from note point for at least several hundred metres.
10	Yes – 41.6ha (mostly extensions of Study Area VU polygons).	Location 1 – Parkland Reserve, Munglinup River Corridor, just north of Mills Road (2km north-west of Study Area).	Likely representative in a local and regional context: characteristic taxa *Eucalyptus conglobata*, *Calothamnus quadrifidus*, *Hakea lissocarpha, Melaleuca hamata* and *Gahnia ancistrophylla* widespread and relatively common at note point; soils and substrate (clay loam with quartz gravel) present.	Possibly extensive – appears to extend north from note point for at least several hundred metres.
11	No, however this unit was located during the regional survey	Location 1 – East Naemup Nature Reserve (5km west of Study Area).	Likely representative in a local and regional context: indicator taxa *Melaleuca uncinata*, *Melaleuca elliptica* and *Leptospermum oligandrum*, and characteristic taxa *Acacia sulcata, Astus tetragonus* and *Calothamnus quadrifidus* widespread and relatively common at note points; soils and substrate (granite-derived over granite outcropping) present.	Appears relatively extensive – present as a linear band that occurs along the eastern boundary of the reserve for approximately 3km, extending west approximately 300m.
		Location 2 – Crown Land (Shire of Ravensthorpe) (Uncleared), Munglinup River Corridor, Rawlinson Road (10km north-west of Study Area).	Likely representative in a local and regional context: indicator taxa *Melaleuca uncinata*, and characteristic taxa *Acacia sulcata* and *Calothamnus quadrifidus* widespread and relatively common at note point; soils and substrate (granite-derived over granite outcropping) present.	Appears small – patch appears to be approximately 200m by 100m near Rawlinson Road.
		Location 3 – Crown Land (Shire of Ravensthorpe) (Uncleared), Munglinup River Corridor, Rawlinson Road (10km north-west of Study Area).	Likely representative in a local and regional context: indicator taxa *Melaleuca uncinata*, and characteristic taxa *Acacia sulcata* and *Calothamnus quadrifidus* widespread and relatively common at note point; soils and substrate (granite-derived over granite outcropping) present.	Appears small – patch appears to be approximately 100m by 100m near Rawlinson Road.

VU	Mapped Outside Study Area via Extrapolation	Location (Including Tenure) of Potential Occurrences in Wider Region	Relationship of Regional Locations to VUs	Possible Extent of Occurrence
		Location 4 – Crown Land (Shire of Ravensthorpe) (Uncleared) and Parkland Reserve, Munglinup River Corridor, Rawlinson Road (10km north-west of Study Area).	Likely representative in a local and regional context: indicator taxa *Melaleuca uncinata*, and characteristic taxa *Acacia sulcata* and *Calothamnus quadrifidus* widespread and relatively common at note point; soils and substrate (granite-derived over granite outcropping) present.	Potentially extensive – appears to occur as a mosaic with a different vegetation type, but over a large area north and south.
		Location 5 – Parkland Reserve, Young River Corridor, between Oldfield and Mills Roads (16km north-east of Study Area).	Likely representative in a local and regional context: indicator taxa *Melaleuca uncinata*, *Leptospermum oligandrum* and *Melaleuca elliptica*, and characteristic taxon *Acacia sulcata* widespread and relatively common at note point; soils and substrate (granite-derived over granite outcropping) present.	Appears small – patch appears to be approximately 150m by 100m.
		Location 6 – Parkland Reserve, Young River Corridor, near Mills Road crossing (11km north-east of Study Area).	Possibly representative in a local and regional context: indicator taxa *Melaleuca uncinata* widespread and relatively common at note point; soils and substrate (granite-derived over granite outcropping) present. However, other indicator and characteristic taxa not seen, but may be present as area not thoroughly examined.	Possibly extensive – occurs as part of a mosaic with another vegetation type, mosaic appears to extend for approximately 1km north and east of note point.
15	No, however this unit was located during the regional survey	Location 1 – Parkland Reserve, Young River Corridor, between Oldfield and Mills Roads (15km north-east of Study Area).	Not representative in a local context; possibly representative in a regional context: indicator taxa *Eucalyptus indurata* and *Pultenaea calycina* subsp. *proxena* (P4), and characteristic taxon *Eucalyptus conglobata*, relatively widespread and occasionally common, however, indicator taxa *Boronia inornata* subsp. *inornata* and *Choretrum glomeratum* very rare, and indicator taxon *Melaleuca pauperiflora* subsp. *pauperiflora*, which dominates at all known occurrences of VU 15, completely absent.	Appears small – occurs as part of a mosaic of vegetation types in an area approximately 800m by 350m.

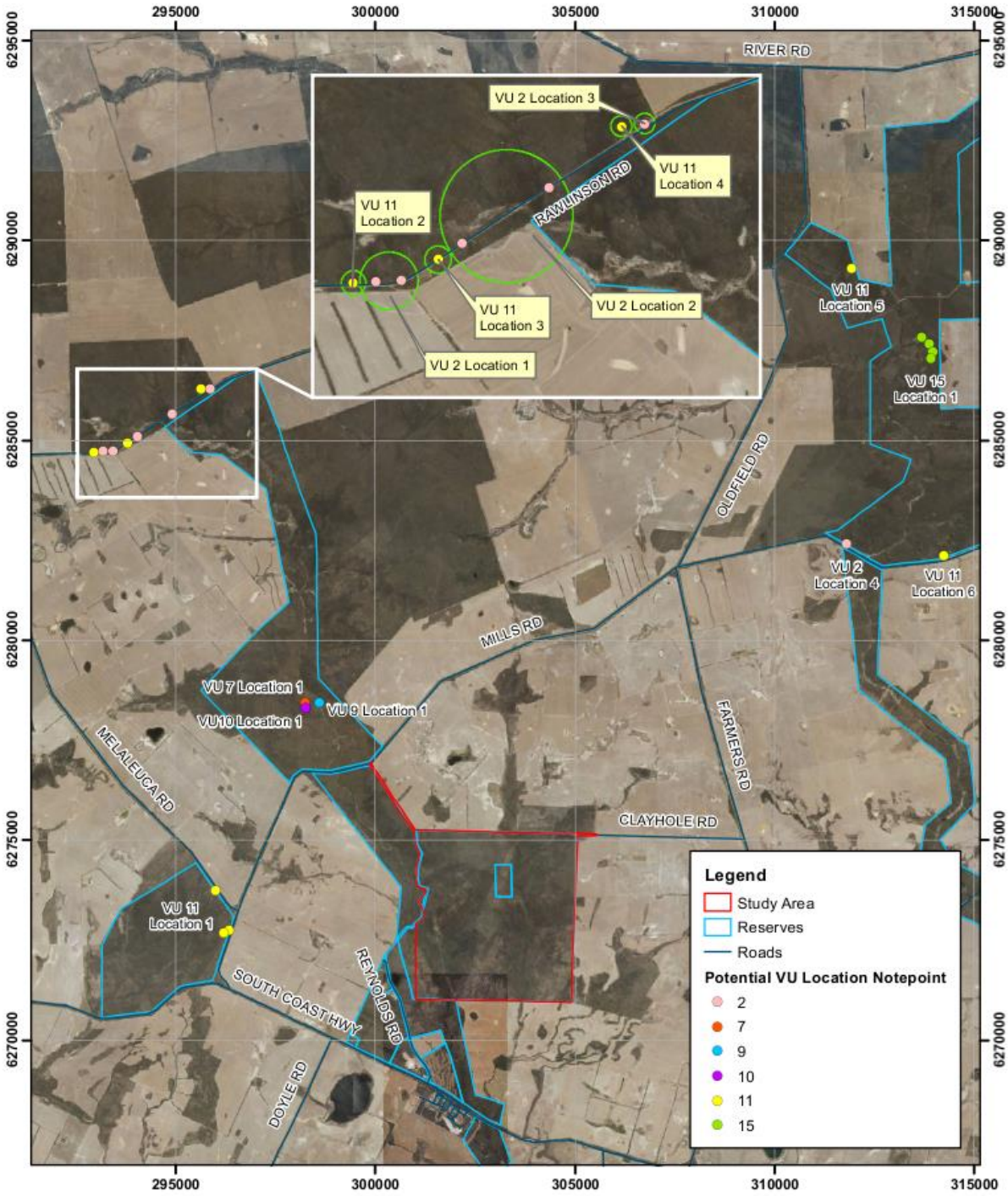


Figure 4-16 Regional Location of Restricted Vegetation Units
(Source: Woodman Environmental, 2020a)

4.6.3 Vegetation Condition

Woodman Environmental assessed the vegetation condition within the development envelope during 2018-2020 fieldwork (Woodman Environmental, 2020a) as being mainly "pristine" within the Study Area (Table 4-9). There was little evidence of unnatural disturbance, with weeds generally absent or at very low levels across the development envelope, and no evidence of *Phytophthora cinnamomi* (*Phytophthora* Dieback) impact. During the field assessments several areas were observed to be in poorer condition, as outlined below:

- A strip of vegetation that covers almost all of the eastern, northern and southern edges of the Study Area has been historically chained for fire control purposes, and has been assessed as being in Good condition and containing a relatively high cover of weeds;

- All the major drainage channels in the development envelope were mapped as either Excellent or Very Good; these areas had relatively high weed cover, and numerous, relatively recent tree deaths were observed, which are potentially related to rising salinity in the drainage lines because of broad scale land clearing and resultant groundwater table rises. In particular, the narrow tributary of the Munglinup River that enters the development envelope on its north-western boundary has had a deep drain cut to it from a swamp in a nearby property (Figure 4-17), which has undoubtedly resulted in higher volumes of saline water entering the tributary than normal; this appears to explain the particularly high weed levels and tree deaths in this area.
- A small area of VU 16 along the eastern edge of the development envelope was observed to have experienced significant recent death of mallees and shrubs (i.e. leaves still present on plants); this appears to be the result of a drain being cut from a neighbouring property to the edge of the Study Area (Figure 4-17) that has allowed saline water to flow into the vegetation in the development envelope. The soil has consequently become waterlogged and muddy. This area was mapped as Good.

Table 4-9 Vegetation Condition Ratings Mapped across the Study Area

Condition Rating	Area Mapped (ha)
Pristine	1,579.1
Excellent	57.4
Very Good	10.4
Good	20.7
Completely Degraded	4.4

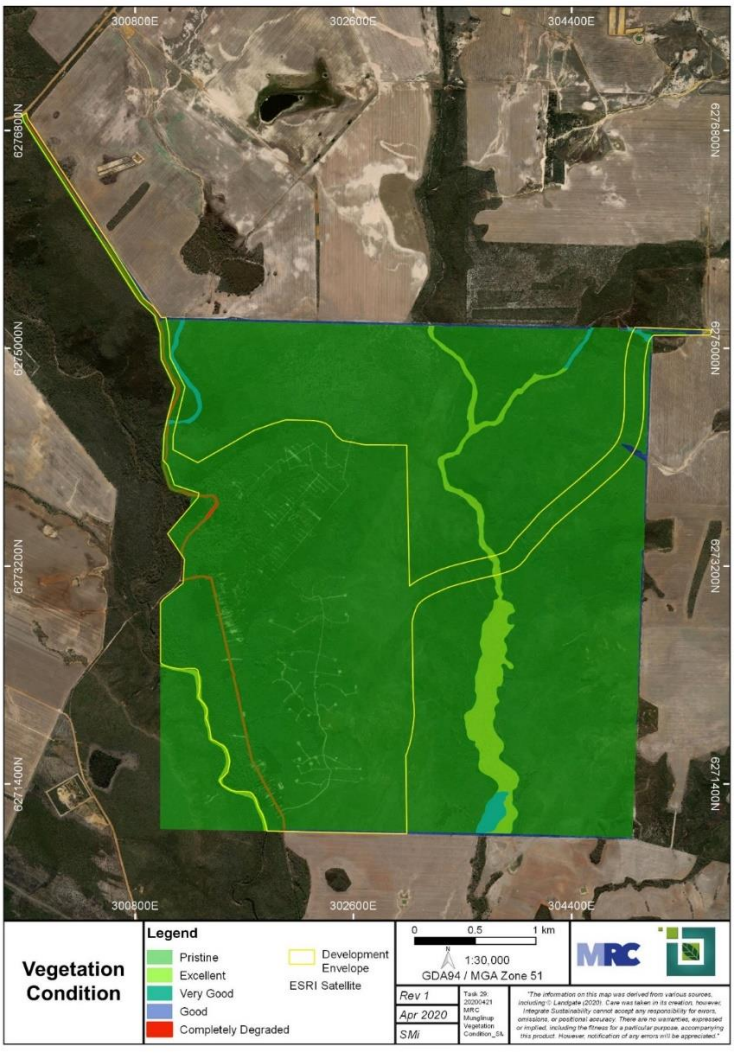


Figure 4-17 Study Area Vegetation Condition (Woodman Environmental, 2020a)

4.6.4 Conservation Significant Flora and Vegetation

4.6.4.1 Conservation Significant Flora

In 2015, Ecologia completed a desktop review and field assessment of the flora and vegetation within the Munglinup area (Ecologia Environment, 2015). In 2015, the database search identified 61 conservation significant flora taxa, six of which were listed as Threatened (Ecologia Environment). None of the six Threatened flora taxa identified in the database searches were recorded during the 2015 survey completed by Ecologia (2015). Three Priority Flora taxa were recorded by Ecologia (2015) during the 2015 survey.

Since 2015, Woodman Environmental have conducted several field surveys and provided additional reports (Table 4-1). A total of 12 significant flora taxa were recorded within or adjacent to the development envelope during the 2018-2020 surveys; this included one Threatened taxon *Conostylis lepidospermoides* (Figure 4-18; Table 4-10), seven Priority flora taxa (Figure 4-19; Table 4-10) (one of which is an uncertain identification), and four taxa that are considered significant because they area either undescribed / novel taxa, known from very few records, or are range extension (Figure 4-20) (EPA, 2016a). Of these, six species were located within the Development Envelope and five within the Disturbance footprint. Two of the species found within the Disturbance footprint are Priority 4 and the other three are the novel taxa. Three of these taxa (two Priority flora taxa and one potentially undescribed taxon) were previously recorded in the Study Area by Ecologia (2015) (Table 4-10).

Another Threatened taxon *Rhizanthella johnsonii* while not recorded during any of the survey has the potential to occur as a relatively dense stands of *Melaleuca hamata*, a known host species has been observed. Woodman Environmental completed targeted flora and vegetation work within the Project area in June 2018 to define habitat potentially suitable for the Underground Orchid (*Rhizanthella johnstonii*) (Woodman Environmental, 2018b). The targeted survey for *Rhizanthella johnstonii* (T) located what was considered to be potential habitat for this species, based on the presence of relatively dense stands of *Melaleuca hamata*, a known host species. However, it was noted that the habitat differed significantly from nearby known habitat adjacent to the Oldfield River, particularly in the presence of a dense sedge layer (absent at known habitat), and a relatively heavy clay soil (Figure 4-18). The known host species *Melaleuca hamata* also never formed thickets such as those that occur at the nearby known location of this species. *Melaleuca uncinata*, another known host species, was also recorded in the Study Area, however the habitat that it occurred in was not considered to be suitable, as it occurred on the edge of granite outcrops.

Searching of the identified potential habitat at a time when *Rhizanthella johnstonii* plants are visible above-ground (July) located no plants. Based on this, and the apparently limited suitability of the potential habitat mentioned above, it is considered very unlikely that this taxon occurs in the Study Area.

Conostylis lepidospermoides (T) was recorded at four locations in the Study Area with a total of 67 individuals recorded; these represent 2 populations (Figure 4-18). These locations were in the central northern part of the Study Area in an area mapped as VU 16; the soils where this taxon was located were sandier than typical for this VU. Specific searching of VU 16 that was mapped in the development envelope was undertaken, with no locations recorded; it is unlikely to occur within the development envelope, with most of the areas of VU 16 considered too clayey and gravelly to support this species. However, several locations are immediately north of the northern boundary of the development envelope. It is possible there are further individuals in the Study Area; however, field observations indicate they will likely only occur in the vicinity of recorded locations (Woodman Environmental, 2020a).

Of the 12 significant flora of the study area, six have been identified within the development envelope; three of these species are recognised as priority species and three are significant for other reasons (Table 4-10) (Woodman Environmental, 2020a):

- *Commersonia rotundifolia* – (P3);
- *Pultenaea calycina subsp. proxena* – (P4);

- *Stachystemon vinosus* – (P4);
- *Leucopogon aff. canaliculatus* – Other;
- *Synaphea aff. drummondii* – Other; and
- *Synaphea sp.* Jilakin Flat Rocks Rd (R. Butcher et. Al RB200) – Other.

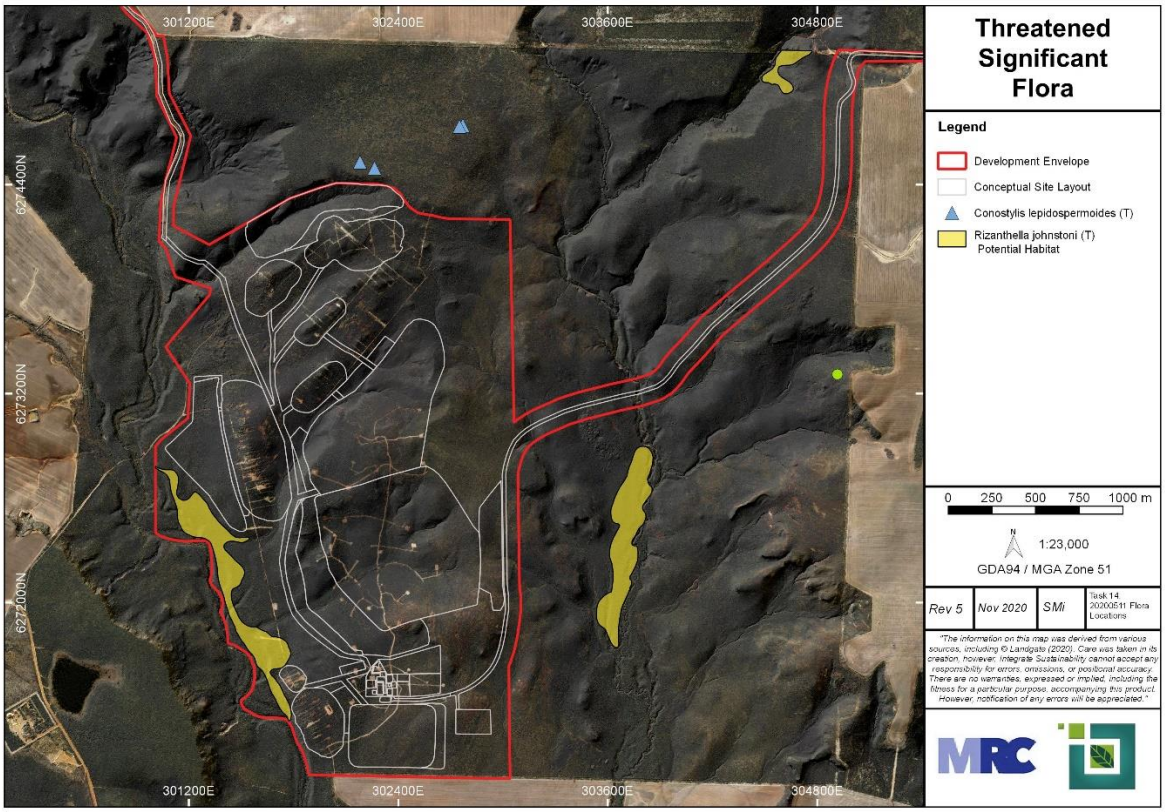


Figure 4-18 Threatened Significant Flora Records (Woodman Environmental, 2020a)

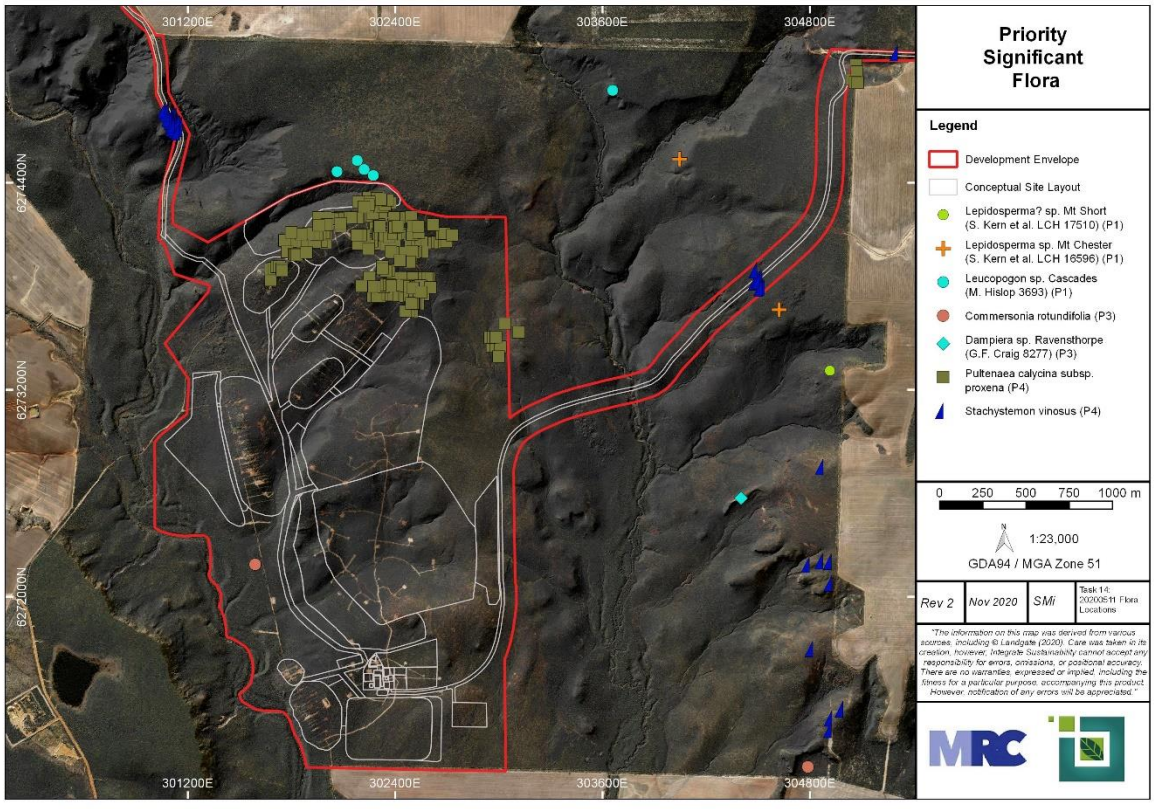


Figure 4-19 Priority Significant Flora Records (Woodman Environmental, 2020a)

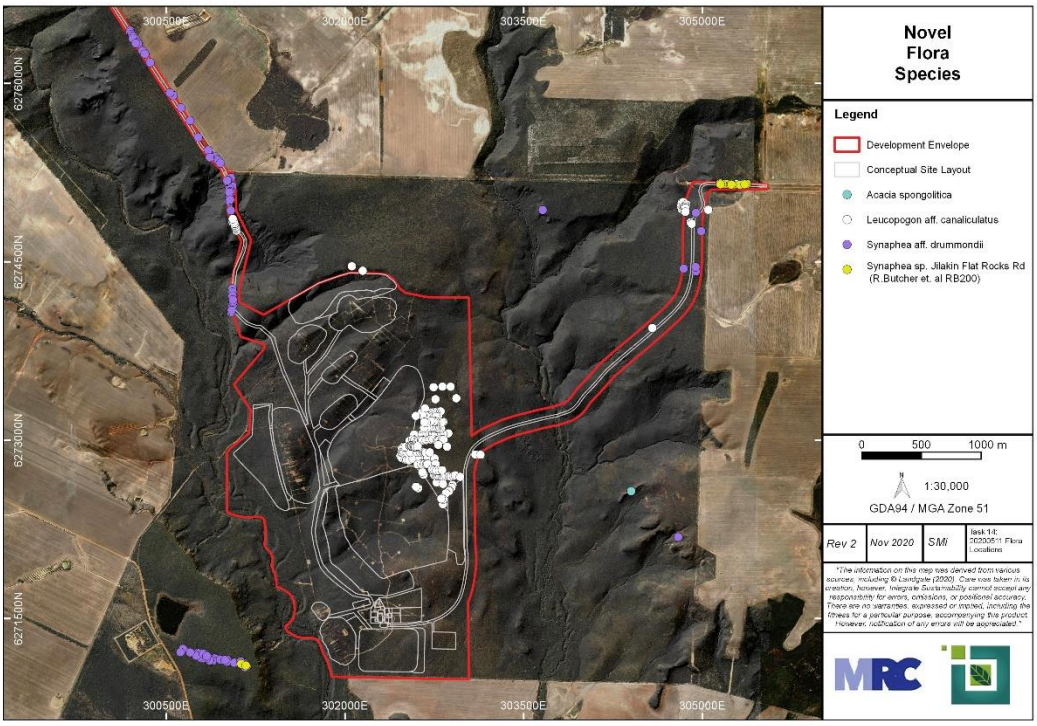


Figure 4-20 Noval Flora Species Records (Woodman Environmental, 2020a)

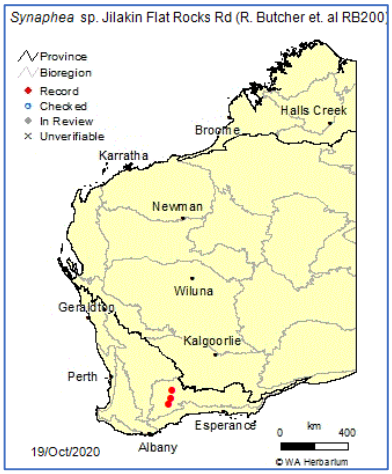


Figure 4-21 Known Occurrences of Synaphea sp. Jilakin Flat Rocks Rd

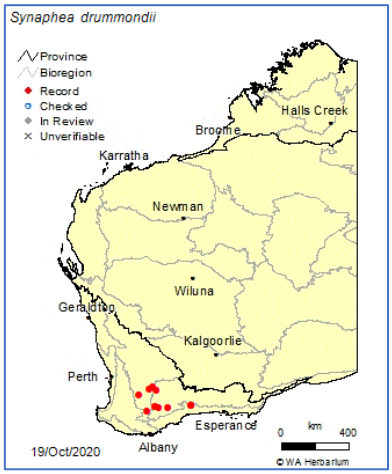


Figure 4-22 Known Occurrences of Synaphea drummondii

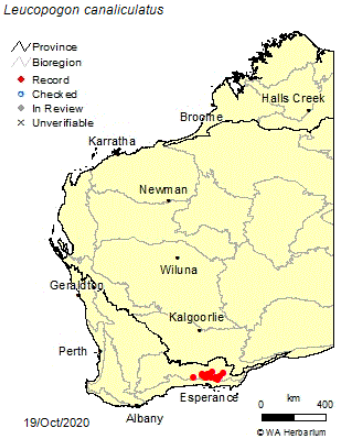


Figure 4-23 Known Occurrences of Leucopogon canaliculatus

Table 4-10 Occurences of Significant Flora Taxa Recorded within the Study Area (Woodman Environmental, 2020a)

Taxon	Status	Number of Locations Recorded				Number of Individuals Recorded				Number of Populations[$] Recorded				Vegetation Units
		Inside Study Area		Outside Study Area	Total	Inside Study Area		Outside Study Area[%]	Total	Inside Study Area		Outside Study Area	Total	
		2019-2020 Survey	Previous Surveys			2019-2020 Survey	Previous Surveys			2019-2020 Survey	Previous Surveys			
Conostylis lepidospermoides	T (VU)	4	0	0	4	67	0	0	67	2	0	0	2	16
Lepidosperma sp. Mt Chester (S. Kern et al. LCH 16596)	P1	2	0	0	2	35	0	0	35	2	0	0	2	1, 2
Lepidosperma ?sp. Mt Short (S. Kern et al. LCH 17510)	P1	1	0	0	1	Not recorded	0	0	-	1	0	0	1	6
Leucopogon sp. Cascades (M. Hislop (3693)	P1	5	0	0	5	35	0	0	35	2	0	0	2	16
Commersonia rotundifolia	P3	1	1	0	2	5	30	0	35	1	1	0	2	14
Dampiera sp. Ravensthorpe (G.F. Craig 8277)	P3	1	0	0	1	200	0	0	200	1	0	0	1	4
Pultenaea calycina subsp. *proxena*	P4	185	1*	5	190	1372	5*	34	1409	3	1*	1^	4	1, 2, 9, 14, 15
Stachystemon vinosus	P4	50	0	3	53	292	0	4	296	5	0	1^	6	1, 16
Acacia spongolitica	Unusual variant, range outlier	1	0	0	1	Not recorded	0	0	Not recorded	1	0	0	1	4
Leucopogon aff. *canaliculatus*	Potential new taxon	184	2*	0	185	2,009	Not recorded	0	2,009	6	2*	0	6	1, 2, 14, 16
Synaphea aff. *drummondii*	Potential new taxon[#]	62	0	24	86	147	0	103	250	6	0	1^	6	1, 10, 16
Synaphea sp Jilakin Flat Rocks Rd (R. Butcher et. Al RB200).	Potential new taxon	13	0	0	13	92	0	0	92	2	0	0	2	2, 16

Note:
Rows highlighted in green represent known occurrences within the development envelope.
[$]Numbers of populations are based on the definition of a population provided in Section 3.9.1. of Woodman Environmental, 2020.
[*]The previously recorded location of *Pultenaea calycina* subsp. *proxena* and the locations of *Leucopogon* aff. *canaliculatus* was revisited by this survey; therefore, associated data (Ecologia 2015) has been superseded by data recorded by this survey.
^Population comprises locations and individuals from both inside and outside Study Area.
[%]Outside Study Area refers to locations, individuals and populations recorded by this survey and Ecologia (2015) only.

Table 4-11 Direct Impact to Significant Flora Taxa within the Development Envelope

Significant Flora Taxa	Status	Within Disturbance Footprint (No.)	Significance of Local Populations	Scale of Potential Local Impact	Scale of Potential Local Impact	Scale of Potential Regional Impact	Significance of Potential Regional Impact	Comments
Commersonia rotundifolia	P3	No	Low	Nil	Moderate	Low	Low	The relative scarcity of known locations within the Study Area as a whole is representative of the limited area of appropriate time since fire as the taxon is a fire responder. The one known population in the Development envelope (Ecologia 2015) was not re-located in 2019, most likely due to senescence since the last burn (Woodman Environmental 2020). The other known population in the Study Area is not at risk of impact. The regional significance of impact is ranked Low due to a combination of the Low significance of the local populations of this taxon and the moderate scale of potential local impact to preferred habitat for this taxon. ***No records found within the disturbance footprint.***
Pultenaea calycina subsp. *proxena*	P4	Yes (577)	Low	High	Moderate	Low	Low	All three of the populations recorded in the Study Area will be impacted to some extent; the largest population is entirely located within the Development envelope, whilst two of the smaller populations extend outside of the Development envelope. The scale of local potential impact is Moderate-High due to the large proportion of both numbers of known individuals and habitat occurring within the Development envelope (94.0% of individuals; 38.2% of the preferred habitat of the Study Area). The regional significance of impact is ranked Low, due to the relatively large number of known populations and the location of the Study Area being within the known range of this taxon. ***58% of the plants are outside the disturbance footprint***
Stachystemon vinosus	P4	Yes (74)	Low	High	Moderate	Low	Low	Two of the five populations of this taxon in the Study Area are located entirely within the development envelope; the other three are not at risk of impact by the development envelope. The two populations in the development envelope are located in the service corridors associated with the Development envelope, and these populations may extend further into the Study Area. It is likely that Project design can avoid at least some of these individuals and therefore reduce overall impact to this taxon. Despite the scale of potential Local impact being ranked Moderate-High, the regional significance of potential impact is ranked Low due to the relative Low significance of the local populations to the overall conservation status of the taxon. ***76.4% of the plants are located outside the disturbance footprint***

Significant Flora Taxa	Status	Within Disturbance Footprint (No.)	Significance of Local Populations	Scale of Potential Local Impact	Scale of Potential Local Impact	Scale of Potential Regional Impact	Significance of Potential Regional Impact	Comments
Leucopogon aff. canaliculatus	Potential New Taxon	Yes (175)	High	Low	Moderate	Low	Moderate	Of the six populations of this taxon within the Study Area, only one is not located in the development envelope. Two populations are located entirely within the development envelope (including the largest population), and three are partially located within the development envelope. The range of the populations within the development envelope were noted to extend outside into the Study Area but were not as intensively surveyed. Therefore, the higher percentage of individuals in the development envelope is a reflection of survey constraints rather than the taxon being truly primarily located in the development envelope. The largest population is located entirely within the development envelope. Two other populations are located on the service corridor extensions of the development envelope, and the extent of the populations in these areas are likely to be extend further into the Study Area. It is likely that Project design can avoid at least some of these individuals and therefore reduce overall impact to this taxon. ***91.3% of the plants are located outside the disturbance footprint***
Synaphea aff. drummondii	Potential New Taxon	Yes (13)	High	Moderate	Low	High	Moderate	Six populations of *S. aff. drummondii* were recorded in the Study Area, mainly in the northern and western extents. Not all populations were fully censused in the Study Area due to time constraints, and not all suitable habitat in the Study Area was surveyed (or able to be surveyed, due to length of time since fire). Five of the known populations will be impacted by the development envelope, with approximately half of all known locations and individuals located within the development envelope. However, the higher percentage of individuals in the development envelope reflects survey constraints rather than the taxon being truly primarily located in the development envelope. The majority of locations are located within service corridor routes of the development envelope, with high likelihood of extent of these populations extending outside of the corridors into the Study Area. It is likely that Project design can avoid at least some of these individuals and therefore reduce overall impact to this taxon. The regional significance of potential impact has been ranked Moderate despite the High significance of local populations, due to the Moderate and Low scale of potential local impact attributed to numbers of individuals and habitat respectively. ***95.2% of the plants are located outside the disturbance footprint***

Significant Flora Taxa	Status	Within Disturbance Footprint (No.)	Significance of Local Populations	Scale of Potential Local Impact	Scale of Potential Local Impact	Scale of Potential Regional Impact	Significance of Potential Regional Impact	Comments
Synaphea sp. Jilakin Flat Rocks Rd (R. Butcher et. Al RB200)	Potential New Taxon	No)	Moderate-High	High	Low	High	Moderate – High	One of the two populations of *Synaphea sp*. Jilakin Flat Rocks Rd (R. Butcher et. Al RB200) in the Study Area is located in the development envelope; this population is located on a Service Corridor area and it is likely that the population extends further into bushland either side of the development envelope. It is likely that The Project has been designed to avoid these individuals and therefore reduce overall impact to this taxon. Although the scale of local potential impact to individuals is High (98.9%), there has been a lack of survey for this taxon within the greater Study Area and therefore this is considered an over-estimate of the actual impact. The regional Moderate-High significance of potential impact acknowledges the lower scale of impact to preferred habitat of this taxon. ***No records found within the disturbance footprint***

4.6.4.2 Conservation Significant Vegetation

In 2015, Ecologia identified one vegetation community within the MRC Graphite tenure where Proteaceae species are the dominant layer (Ecologia Environment, 2015). This vegetation community was considered to be part of the Proteaceae Dominated Kwongkan Shrubland Threatened Ecological Community (Kwongkan Shrubland TEC).

In 2018-2020, Woodman Environmental completed a series of field surveys to refine the mapped extent of the Kwongkan Shrubland TEC (Woodman Environmental, 2020a). In 2020 Woodman conducted a targeted survey for regional VUs, this survey extrapolated further Kwongkan Shrubland TEC vegetation units along the western access. The TEC comprises 374ha of primarily pristine vegetation located in the Project and extrapolated areas as seen in Figure 4-24 (Woodman Environmental, 2020b), of this 33ha (8.8%) is within the Development Envelope and 10ha (2.76%) are located within the Disturbance Footprint.

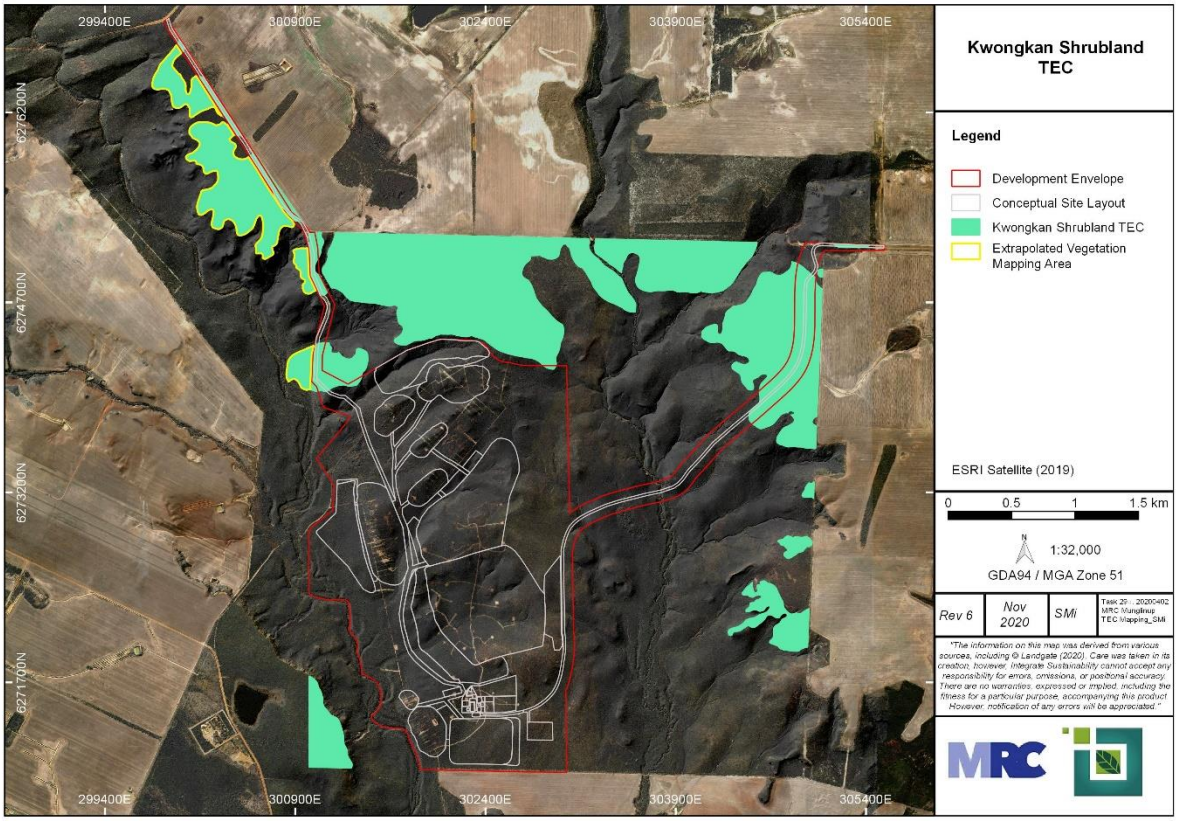


Figure 4-24 Kwongkan Shrubland TEC (Woodman Environmental, 2020a)

4.6.5 Groundwater Dependant Ecosystems

Four VUs described in the Study Area, being VUs 8, 9, 12 and 13, occur within or in association with drainage lines that are considered to be wetlands in the broad sense. These drainage lines are likely subject to at least regular ephemeral flows, with the Munglinup River possibly flowing permanently. It is therefore considered that these VUs are likely dependent on surface water flows, including in the form of run-off from adjacent areas and potentially from more remote areas upstream. VU 8 in particular, extends some way away from the river within a narrow valley (Woodman Environmental, 2020a).

It is considered possible that the above VUs may be dependent to an extent on groundwater where the inferred potential dependence is based on the occurrence of the tree species *Eucalyptus occidentalis* and *Melaleuca cuticularis* in these VUs. However, it should be noted that neither of these species appears to be an obligate phreatophyte based on the limited literature available, as well as field observations by Woodman Environmental. Both species have been observed growing in drainage lines high in the landscape near Ravensthorpe where the groundwater table is known to be

inaccessible to vegetation, indicating a dependence on surface water. In the case of *Melaleuca cuticularis*, a requirement for permanent surface water appears probable, given that it only occurs in creeks and on lake and estuary edges, often in standing water.

Rockwater (2020) have recently investigated the hydrogeology of the western part of the Study Area, with groundwater recorded within 10m (as shallow as 3m in places) of ground level at a number of bores along the Munglinup River. As it is generally accepted that vegetation can access groundwater up to this depth, the occurrences of VUs 8, 9 and 12 along the Munglinup River in the Study Area may be considered potentially groundwater-dependent where the groundwater is less than 10m below the surface. However, the local groundwater was found to be highly saline with salinities of approximately 20,000mg/L and above recorded within most bores making it unsuitable for use by most terrestrial species. The remaining areas of these VUs, as well as all occurrences of VU 13, occur away from the location of bores installed as part of this study where modelled depth to groundwater shows that the depth to groundwater rapidly rises to over 20m within 500m of the river and major creeks in response to topography.

Rockwater investigations indicated that soils of the Study Area above the water table are all saprolitic clays that are oxidised and commonly slightly ferruginous. They are of very low permeability and likely to support the larger mallee species that occur in these areas via stored soil water rather than the vegetation accessing the water table or freshwater lenses resting on denser saline water tables.

It therefore appears unlikely that any of the VUs recorded in the Study Area rely upon the local groundwater table for survival, utilising clay soil stored moisture from rainfall as their primary source of water during drier months. In particular those VUs that occur higher in the landscape (the majority of Study Area VUs, including VUs 16 and 17 which comprise the Kwongkan Shrubland TEC are situated where the water table is located well in excess of 10m from the ground surface and therefore are not groundwater dependent.

4.6.6 Introduced Flora

Eighteen environmental weeds were recorded by Woodman Environmental (Woodman Environmental, 2020a) within the Project area (Figure 4-25), none of which were identified as Weeds of National Significance (WONS) or Declared Pests (weeds). One weed, *Cirsium vulgare* is considered to be a weed of interest. The environmental weeds recorded are identified in Table 4-12.

Table 4-12 Introduced Flora Recorded at the Study Area.

Taxon	Number of locations recorded
Briza minor	1
Cirsium vulgare	2
Conyza bonariensis	1 confirmed; 1 unconfirmed (poor material)
Cotula coronopifolia	2
Ehrharta longiflora	10
Galium murale	1
Hypochaeris glabra	11
Lepidium africanum	1
Lysimachia arvensis	5
Parapholis incurva	1
Parentucellia latifolia	1
Pentameris airoides subsp. *airoides*	1 confirmed; 1 unconfirmed (poor material)
Rumex crispus	1
Solanum nigrum	2
Sonchus oleraceus	5
Ursinia anthemoides subsp. *anthemoides*	4
Vellereophyton dealbatum	2
Vulpia myuros	1

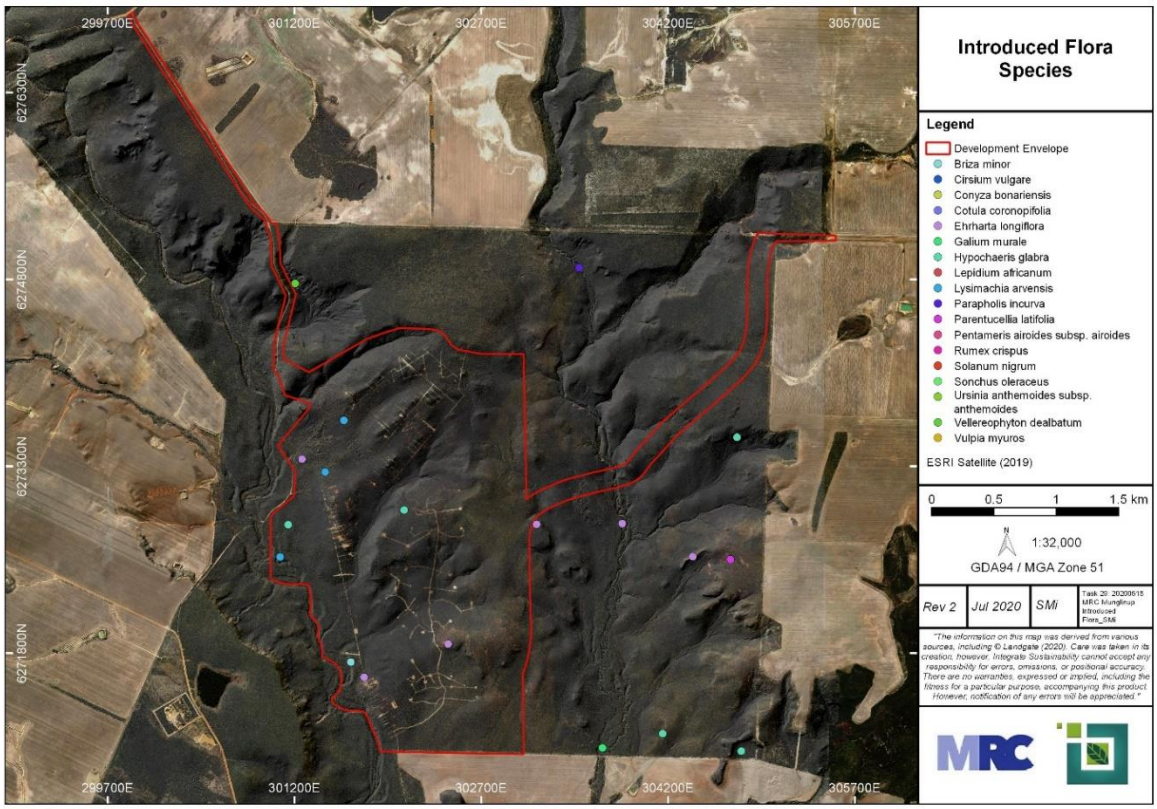


Figure 4-25 Introduced Flora Species of the Project Area

4.6.7 *Phytophthora* Dieback

The pathogen *Phytophthora cinnamomi* is an agent of environmental disease found in vulnerable areas of Western Australia. *Phytophthora* Dieback is the common name for the observable disease that is the result of interaction between the pathogen (*P. cinnamomi*) and the vegetation of susceptible plant species. Areas vulnerable to *Phytophthora* Dieback are defined as native vegetation occurring west of the 400-millimetre rainfall isohyet (Glevan Consulting, 2018; GSBL, 2020). The Project is located within the Dieback Risk Zone.

Two *Phytophthora* Dieback surveys have been completed to date across the Project Area. The first being in 2018 by Glevan Consulting (Glevan Consulting, 2018) (Appendix C-5) and the second occurring in 2019 by Great Southern Bio Logic (GSBL) (GSBL, 2020); (Appendix C-6) GSBL also completed an impact assessment during the field survey to detail the prevention of the spread of dieback in the Project area (GSBL, 2020), this impact assessment is included within the main report.

Phytophthora Dieback occurrence within the Ravensthorpe / Esperance area indicates that the pathogen has been identified at a number of locations and is present within the region (DIDMS, 2018). There are a significant number of known infestations associated with roadside vegetation throughout the Ravensthorpe/ Esperance area (GSBL, 2020). The vegetation associated with the infestations are typically Proteaceae and Ericaceae rich shrubland and *Banksia* woodland. The occurances general occur to south of the South Coast Highway (DIDMS, 2018; Glevan Consulting, 2018). The closest recorded infestation is approximately 5km to the east of the Project on Farmers Rd (Figure 4-26).

The only area of infestation within the Study Area observed during the GSBL assessment was identified along Farmers Rd. Glevan Consulting also recorded the presence of *Phytophthora Dieback* in the township of Munglinup and along a portion of Reynolds Road which were not previously mapped as infested (Glevan Consulting, 2018). During the 2019 GSBL *Phytophthora* Dieback assessment no disease expression was observed within the Munglinup Mining R24174/Project area and is considered protectable. During both the 2018 and 2019 surveys the majority of the vegetation within the Project was mapped as uninterpretable due to an insufficient coverage of reliable indicator species (Figure 4-26) (GSBL, 2020; Glevan Consulting, 2018).

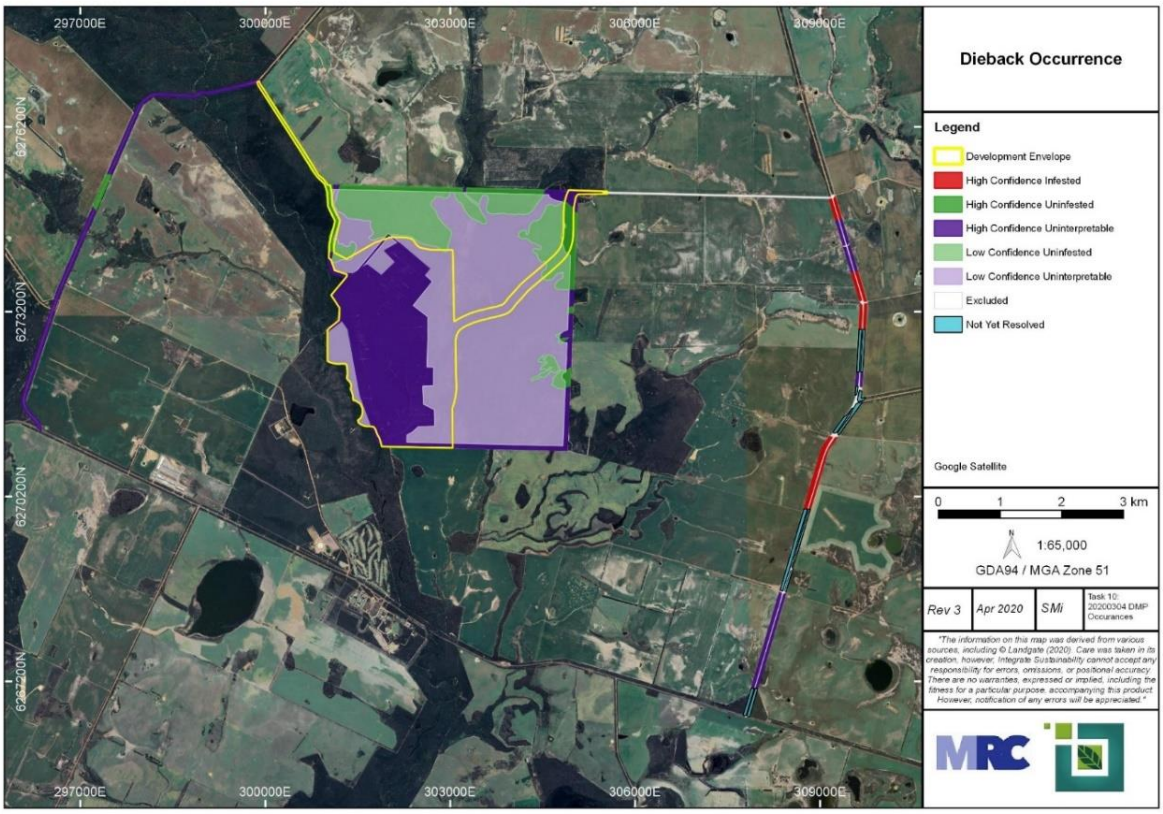


Figure 4-26 Project Area Regional Phytophthora Dieback Occurrences

4.7 Terrestrial Fauna

The Project is located within the south-west of Western Australia and the internationally listed Southwest Biodiversity Hotspot. This region is classified as a biodiversity hotspot because of the concentration of endemic species (including fauna species) and the threats facing these species (Myers, et al., 2000).

Studies examining the fauna and fauna habitats of the Project area commenced in December 2014 when Ecologia completed a 4 days survey (Ecologia Environment, 2015). In 2018, Biostat Pty Ltd (2018) completed a peer review of the Ecologia fauna report. As an outcome of the peer review, supplementary fauna field assessment was completed in April (5-days) (Red Dog Environmental, 2018a) and November 2018 (6-days) by Red Dog Environmental (2018b). The purpose of the field assessment was to refine threatened species habitat specifically for black cockatoos, determine the presence of conservation significant bats within the Project area as well as update changes in taxonomy and conservation status (Red Dog Environmental, 2018a).

Post the Project Referral, the EPA advised a level 2 terrestrial fauna survey should be undertaken across the development envelope. The findings of each of these studies are summarised in the sections below. Copies of the Level 2 terrestrial fauna survey and impact assessment memo are available in Appendix C-7 and Appendix C-8 respectively.

4.7.1 Faunal Assemblage

The State and Commonwealth fauna databases were consulted to generate a potential fauna list for the Munglinup Graphite Project. This list was compiled in 2015 by Ecologia and revised in 2018 by Red Dog Environmental and in 2020 by Western Ecological to produce Table 4-13. The databases search includes the Western Australian Museum, EPBC Protection Matters search, DBCA Threatened Fauna Database and DBCA Survey Returns Database using NatureMap, as well as the BirdLife Australia Database.

The 2014 field survey completed by Ecologia recorded a total of 64 fauna species from direct sightings and indirect evidence (scats, tracks and calls). This included five mammals, 52 birds and seven reptiles

(Ecologia Environment, 2015). The supplementary fauna survey completed in 2018 by Red Dog Environmental, recorded a total of 62 fauna species from direct sightings and indirect evidence (scats, tracks and calls). A further study by Red Dog Environmental in 2018, to include the eastern extent of R 24714 from the Western boundary of M74/245 brought the total of both surveys to included eight mammals, 46 birds and eight reptiles (Red Dog Environmental, 2018a).

The 2019 study conducted by Western Ecological recorded a total of 17 fauna species, 22 reptile species, 1 amphibian species and 47 avian species from direct sightings and indirect evidence (scats, tracks and calls) (Western Ecological, 2020a). The fauna species recorded during all fauna surveys are presented in Table 4-13. An opportunistic sighting of Carnaby's Cockatoo was also made within the development envelope in June 2018.

Since 2014, a total of 20 mammal species, 77 avian species, 28 reptiles and 1 amphibian recorded from either direct sightings or indirect evidence (scats, tracks or calls) have been observed, of which five were introduced species.

Table 4-13 Fauna Species Recorded During Fauna Surveys at Munglinup

(Ecologia Environment, 2015; Red Dog Environmental, 2018a; Red Dog Environmental, 2018b; Western Ecological, 2020a)

Common Name	Scientific Name	2015 Survey	2018 Survey	2019 Survey	Status
MAMMALS					
Southern Brown Bandicoot	*Isoodon obesulus fusciventer*	✓	✓		Priority 4
Echidna	*Tachyglossus aculeatus*			✓	
Common Brushtail Possum	*Trichosurus vulpecula hypoleucus*	✓		✓	
Chocolate Wattled Bat	*Chalinolobus morio*			✓	
Gould's Wattled Bat	*Chalinolobus gouldii*		✓	✓	
Lesser Long-eared Bat	*Nyctophilus geoffroyi*		✓	✓	
Southern Forest Bat	*Vespadelus regulus*		✓	✓	
White-striped Freetail-bat	*Tadarida australis*		✓	✓	
South-western Free-tailed Bat	*Ozimops kitcheneri*			✓	
Western Grey Kangaroo	*Macropus fuliginosus*	✓	✓	✓	
Western Brush Wallaby	*Macropus irma*			✓	Priority 4
Western Bush Rat	*Rattus fuscipes*	✓		✓	
Western Mouse	*Pseudomys occidentalis*			✓	Priority 4
Western Pygmy-Possum	*Cercartetus concinnus*			✓	
Honey Possum	*Tarsipes rostratus*			✓	
House Mouse	*Mus musculus*	✓			Introduced
Red Fox	*Vulpes vulpes*	✓		✓	Introduced
European Rabbit	*Oryctolagus cuniculus*	✓	✓	✓	Introduced
Feral Pig	*Sus scrofa*		✓		Introduced
Cat	*Felis catus*			✓	Introduced
BIRDS					
Carnaby's Cockatoo	*Calyptorhynchus latirostris*		✓	✓	Endangered
Malleefowl	*Leipoa ocellata*	✓			Vulnerable
Emu	*Dromaius novaehollandiae*	✓	✓	✓	
Stubble Quail	*Coturnix pectoralis*	✓			
Pacific Black Duck	*Anas superciliosa*			✓	
Common Bronzewing	*Phaps chalcoptera*	✓	✓	✓	
Brush Bronzewing	*Phaps elegans*	✓	✓		
Crested Pigeon	*Ocyphaps lophotes*	✓	✓		
Tawny Frogmouth	*Podargus strigoides*	✓		✓	
Brown Goshawk	*Accipiter fasciatus*	✓	✓		
Spotted Harrier	*Circus assimilis*	✓			

Common Name	Scientific Name	2015 Survey	2018 Survey	2019 Survey	Status
Wedge-tailed Eagle	*Aquila audax*	✓	✓	✓	
Brown Falcon	*Falco berigora*	✓	✓	✓	
Galah	*Eolophus roseicapillus*	✓	✓	✓	
Regent Parrot	*Polytelis anthopeplus*	✓			
Australian Ringneck	*Barnardius zonarius*	✓	✓	✓	
Red-capped Parrot	*Purpureicephalus spurius*	✓	✓	✓	
Elegant Parrot	*Neophema elegans*	✓	✓	✓	
Shining Bronze-cuckoo	*Chrysococcyx lucidus*	✓	✓		
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	✓			
Sacred Kingfisher	*Todiramphus sanctus*		✓	✓	
Rainbow Bee-eater	*Merops ornatus*	✓	✓		Migratory
Blue-breasted Fairy-wren	*Malurus pulcherrimus*	✓	✓		
White-browed Scrubwren	*Sericornis frontalis*	✓			
Shy Heathwren	*Hylacola cauta whitlocki*	✓			
Southern Boobook	*Ninox novaeseelandiae*		✓		
Weebill	*Smicrornis brevirostris*	✓	✓	✓	
Western Gerygone	*Gerygone fusca*		✓		
Western Thornbill	*Acanthiza inornata*		✓		
Inland Thornbill	*Acanthiza apicalis*	✓			
Spotted Pardalote	*Pardalotus punctatus xanthopygus*	✓	✓	✓	
Striated Pardalote	*Pardalotus striatus*	✓		✓	
Western Spinebill	*Acanthorhynchus superciliosus*	✓	✓		
White-faced Heron	*Ardea novaehollandiae*			✓	
White-eared Honeyeater	*Lichenostomus leucotis*	✓	✓	✓	
Purple-gaped Honeyeater	*Lichenostomus cratitius*	✓	✓		
Yellow-throated Miner	*Manorina flavigula*	✓	✓	✓	
Western Wattlebird	*Anthochaera lunulata*	✓		✓	
Red Wattlebird	*Antochaera carunculata*	✓	✓	✓	
White-fronted Chat	*Epthianura albifrons*	✓	✓		
Tawny-crowned Honeyeater	*Glyciphila melanops*	✓	✓	✓	
Brown Honeyeater	*Lichmera indistincta*	✓	✓	✓	
New Holland Honeyeater	*Phylidonyris novaehollandiae*	✓		✓	
White-Cheeked Honeyeater	*Phylidonyris niger*			✓	
Brown-headed Honeyeater	*Melithreptus brevirostris*	✓	✓		
Gilbert's Honeyeater	*Melithreptus chloropsis*	✓	✓		
Phylidonyris niger	*Melithreptus lunatus*	✓		✓	
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	✓	✓	✓	
White-winged Triller	*Lalage sueurii*	✓	✓		
Golden Whistler	*Pachycephala pectoralis*	✓	✓	✓	
Rufous Whistler	*Pachycephala rufiventris*	✓	✓	✓	
Grey Shrike-thrush	*Colluricincla harmonica*	✓	✓	✓	
Dusky Woodswallow	*Artamus cyanopterus*	✓	✓		
Grey Butcherbird	*Cracticus torquatus*	✓	✓	✓	
Pied Butcherbird	*Cracticus nigrogularis*			✓	
Magpie Lark	*Grallina cyanoleuca*			✓	
Australian Magpie	*Cracticus tibicen*	✓		✓	
Grey Currawong	*Strepera versicolor*	✓		✓	
Grey Fantail	*Rhipidura albiscapa*	✓	✓	✓	

Common Name	Scientific Name	2015 Survey	2018 Survey	2019 Survey	Status
Willie Wagtail	*Rhipidura leucophrys*	✓	✓	✓	
Australian Raven	*Corvus coronoides*	✓	✓		
Restless Flycatcher	*Myiagra inquieta*	✓	✓		
Western Yellow Robin	*Eopsaltria griseogularis*	✓	✓	✓	
Southern Scrub-robin	*Drymodes brunneopygia*	✓	✓		
Silvereye	*Zosterops lateralis*	✓			
Welcome Swallow	*Hirundo neoxena*	✓			
Fairy Martin	*Petrochelidon ariel*	✓	✓		
Tree Martin	*Petrochelidon nigricans*	✓	✓		
Australasian Pipit	*Anthus novaeseelandiae*	✓	✓	✓	
Australian Owlet-nightjar	*Aegotheles crisatus*			✓	
Little Black Cormorant	*Phalacrocorax sulcirostris*			✓	
Black-shouldered Kite	*Elanus axillaris*			✓	
Australian Spotted Crake	*Porzana fluminea*			✓	
Horsfields Bronze Cuckoo	*Chrysococcyx basalis*			✓	
Laughing Kookaburra	*Dacelo novaeguineae*			✓	
Chestnut-rumped Thornbill	*Acanthiza uropygialis*			✓	
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*			✓	
Masked Woodswallow	*Artamus personatus*			✓	
REPTILES					
Bicycle Dragon	*Ctenophorus cristatus*		✓		
Common Scaly Foot	*Pygopus lepidopodus*		✓		
Skink	*Cryptoblepharus spp.*	✓	✓		
Odd-striped Ctenotus	*Ctenotus impar*	✓	✓	✓	
Skink	*Hemiergis spp.*	✓			
Common Dwarf Skink	*Menetia greyii*	✓	✓		
Pale-flecked Morethia	*Morethia obscura*	✓	✓		
Bobtail - Shingleback	*Tiliqua rugosa*	✓	✓	✓	
Heath Monitor	*Varanus rosenbergi*	✓		✓	
Dugite	*Pseudonaja affinis*		✓	✓	
South West Gecko	*Diplodacttylus calcicolours*			✓	
Marbled Gecko	*Christintus marmoratus*			✓	
Sand-Plain Worm-Lizard	*Aprasia repens*			✓	
Marble-Faced Delma	*Delma australis*			✓	
Frasers Legless Lizard	*Delma fraseri*			✓	
Western Three-lined Skink	*Acritoscincus trilineatus*			✓	
Elegant Snake-eyed Skink	*Cryptoblepharus pulcher*			✓	
Jewelled South-west Ctenotus	*Ctenotus gemmula*			✓	
South-western Earless Skink	*Hemiergis initialis*			✓	
Person's Earless Skink	*Hemiergis peronii*			✓	
Southern Four-toed Slider	*Lerista dorsalis*			✓	
Western Blue-tongued Lizard	*Tiliqua occipitalis*			✓	
Dwarf Bearded Dagon	*Pagona minor*			✓	
Southern Blind Snake	*Anilios australis*			✓	
Bardick	*Echiopsis curta*			✓	
Tiger Snake	*Notechis scutatus*			✓	
Mallee Black-backed Snake	*Patasuta nigriceps*			✓	
Western Brown Snake	*Pseudonaja mengdeni*			✓	
AMPHIBIAN					
Western Banjo Frog	*Limnodynastes dorsalis*			✓	

4.7.2 Habitats

Ecologia assessed and mapped fauna habitats within the Project tenure in 2015. A total of eight broadscale fauna habitat types were identified. In 2019, Western Ecological reclassified the fauna habitat types into 6 broadscale fauna habitat types for assessment and mapping during their field assessment (Western Ecological, 2020a). These are discussed below and presented in Table 4-14 and Figure 4-27.

The dominant habitat type across the Project area is Mallee Shrubland which occupies 64.3% of the Study area. The Mallee Shrubland habitat typically occurs on flats and on low hills and is highly variable with a canopy consisting of a number of *Eucalyptus sp*. with an average height of about 5m. No hollows of any significant size were noted in this habitat. The midstorey is often dense and consist of Myrtaceous and Proteaceous shrubs and the ground layer is often made up of sedges with little grass present.

The next most common fauna habitat is the Open Mallee Shrubland which covers 17.5% of the Study area and parts of it likely represents the *EPBC Act* listed TEC - Proteaceae Dominated Kwongkan shrublands of the Southeast Coastal Floristic Province of WA (Woodman Environmental, 2020a). Open Mallee shrubland consists of a sparse canopy comprised of several *Eucalyptus sp*., particularly *Eucalyptus pleurocarpa* with an average canopy height of 5m.

The third most common fauna habitat is the Eucalyptus Woodland which covers 9.5% of the Study area. The canopy is dominated by *Eucalyptus occidentalis* with an average height of about 15m. The midstorey consisting of *Acacia sp., Hakea sp*. and Myrtaceous shrubs is relatively sparse. The ground cover is relatively dense and consists of sedges and some grass with a relatively large amount of litter on the ground.

The three other identified fauna habitats cover only a small percentage of the Study area. These include the Tall Mallee Shrubland (4.3%), Major Drainage Line (3.15%) and Minor Drainage Line (1.25%) (Western Ecological, 2020a). Overall, the habitat condition was identified as very good with minimal disturbance except from access tracks. A large portion of vegetation has been impacted by fire in the last five to ten years resulting in thick regrowth in some areas (Ecologia Environment, 2015).

Table 4-14 Fauna Habitats of the Munglinup Graphite Project
(Western Ecological, 2020a)

Fauna Habitat	Study Area %	Description
Mallee Shrubland	64.3 %	This habitat is widespread across the Study Area on flats and on low hills and is highly variable with a canopy consisting of a number of Eucalyptus sp. with an average height of about 5m. Hollows of any significant size are absent in this habitat and consequently it is not suitable for denning in by conservation significant species such as the Chuditch and Red-tailed Phascogale (it could be used a foraging habitat). The soils are often sandy loam and there can be some surface rock and stones. The midstorey is often dense and consist of Myrtaceous and Proteaceous shrubs and the ground layer is often made up of sedges with little grass present. This habitat is likely to be unsuitable for Malleefowl mound construction given the density of vegetation. This habitat supported a number of skink species and legless lizards, Honeyeaters and other small passerines and small mammal such as the Honey Possum.
Open Mallee Shrubland	17.5%	This habitat is the second most widespread habitat in the Study Area and parts of it likely represents the *EPBC Act* listed TEC - Proteaceae Dominated Kwongkan shrublands of the Southeast Coastal Floristic Province of WA (Woodman Environmental 2019). Open mallee shrubland in the Study Area consists of a sparse canopy of several Eucalyptus sp., particularly *Eucalyptus pleurocarpa* with a canopy height of about 5m. Hollows of any significant size are absent in this habitat as the Eucalypts have stems with a very small DBH [diameter at breast height]), consequently it is not suitable for denning in by conservation significant species such as the Chuditch and Red-tailed Phascogale (it could be used

Fauna Habitat	Study Area %	Description
		a foraging habitat). The midstorey varies in its density across the Study Area but in some areas is very dense. Species that make up the midstorey are dominated by Proteaceous species such as *Banksia spp., Hakea spp., Lambertia sp.* and other myrtaceous shrubs. The ground layer is often made up of sedges and herbs with very little grass. This habitat supports a number of small reptiles (skinks), small passerines and parrots, in particular this habitat represents foraging habitat for Carnaby's Cockatoo. Small mammals such as the Honey Possum (*Tarsipes rostratus*) and Western Mouse have been recorded in this habitat type during the survey.
Eucalyptus Woodland	9.5%	Eucalyptus woodland habitat is the third most widespread habitat in the Study Area. Eucalyptus woodland habitat is primarily associated with the Major drainage line (Munglinup River) that runs through the Study Area (western side of the Study Area) and a relatively small area of this habitat occurs to the west of Munglinup River in the northern section of the Project. The canopy is dominated by *Eucalyptus occidentalis* with an average height of about 15m. The midstorey consists of *Acacia sp., Hakea sp*. and Myrtaceous shrubs is relatively sparse. The ground cover is relatively dense and consists of sedges and some grass with relatively lots of litter on the ground. Hollows of a significant size are absent but there were some small hollows and a few hollow logs in this habitat, consequently there could potentially be some suitable but very limited habitat for denning in by conservation significant species such as the Chuditch and Red-tailed Phascogale (it could be used a foraging habitat). Litter and soil suitable for Malleefowl mound construction is present, but there may not be sufficient vegetation cover in the midstorey (it may be too open). Several species of reptiles were recorded in this habitat, including skinks, geckos, birds and one Western Brown Snake (*Pseudonaja mengdeni*).
Tall Mallee Shrubland	4.3%	This habitat consists primarily of *Eucalyptus flocktoniae* and *E. platypus* in the canopy with a relatively sparse to moderate cover. The midstorey cover varies from almost absent to moderate and is dominated by Myrtaceous shrubs, including *Melaleuca sp*. Ground cover species are almost entirely absent and there is a thick layer of leaf litter. There are no hollows in trees or hollow logs for species such as the Chuditch or Red-tailed Phascogale to den in. The leaf litter provides habitat for skinks and several species were recorded in this habitat as was the small elapid snake – Bardick (*Echiopsis curta*). Grey Currawongs were very common in this habitat type. The Honey Possum was also captured in this habitat. Malleefowl mound construction could be possible due to the quantity of litter, soil and sand and vegetation cover in the canopy, however, not a lot of space between tree stems. However, Ecologia (2015) recorded a Malleefowl moving through this habitat.
Major Drainage Line	3.15%	This habitat is restricted to the edges of Munglinup River bank and is in part defined by its position in the landscape and structures such as rock piles and crevices that do occur along some sections, particularly the northern end of the Study Area where the elevation is greater than at the southern end. Vegetation is comprised of E. *occidentalis* in the canopy with a midstorey of *Acacia sp., Melaleuca sp*. and other Myrtaceous shrubs. The riverbank edges are covered in sedges and some grass, including weedy grasses and other succulent riparian vegetation. Several species of skink were recorded in this habitat type, as was the Dugite (*Pseudonaja affinis*). Several species of birds were recorded in this habitat, including the Australian Spotted Crake (*Porzana fluminea*). There were some small rock crevices that could potentially support den sites for the Chuditch, but there were no observable hollows suitable for the

Fauna Habitat	Study Area %	Description
		Red-tailed Phascogale to den in. Malleefowl mounds are unlikely to be constructed adjacent to a river as rises in water levels may wash away mounds.
Drainage Line	1.25%	This habitat type is the least widespread in the Study Area and is restricted to relatively small drainage (creek) channels. Vegetation is comprised of *E. occidentalis* in the canopy with a relatively dense midstorey *of Acacia sp., Melaleuca sp.* and other Myrtaceous shrubs and Grass Trees (*Xanthorrhoea sp*.). The creek bank edges are covered in sedges, some grass, and other succulent riparian vegetation. Very few species of skink and birds were recorded in this habitat. One Western Pygmy-possum (*Cercartetus concinnus*) was captured in this habitat. There were no rock crevices, hollow logs observable hollows in trees that were suitable for either the Chuditch or Red-tailed Phascogale to den in. Vegetation too thick in the midstorey for Malleefowl to build mounds. Further to this Malleefowl mounds are unlikely to be constructed adjacent to a creek as rises in water levels may wash away mounds.

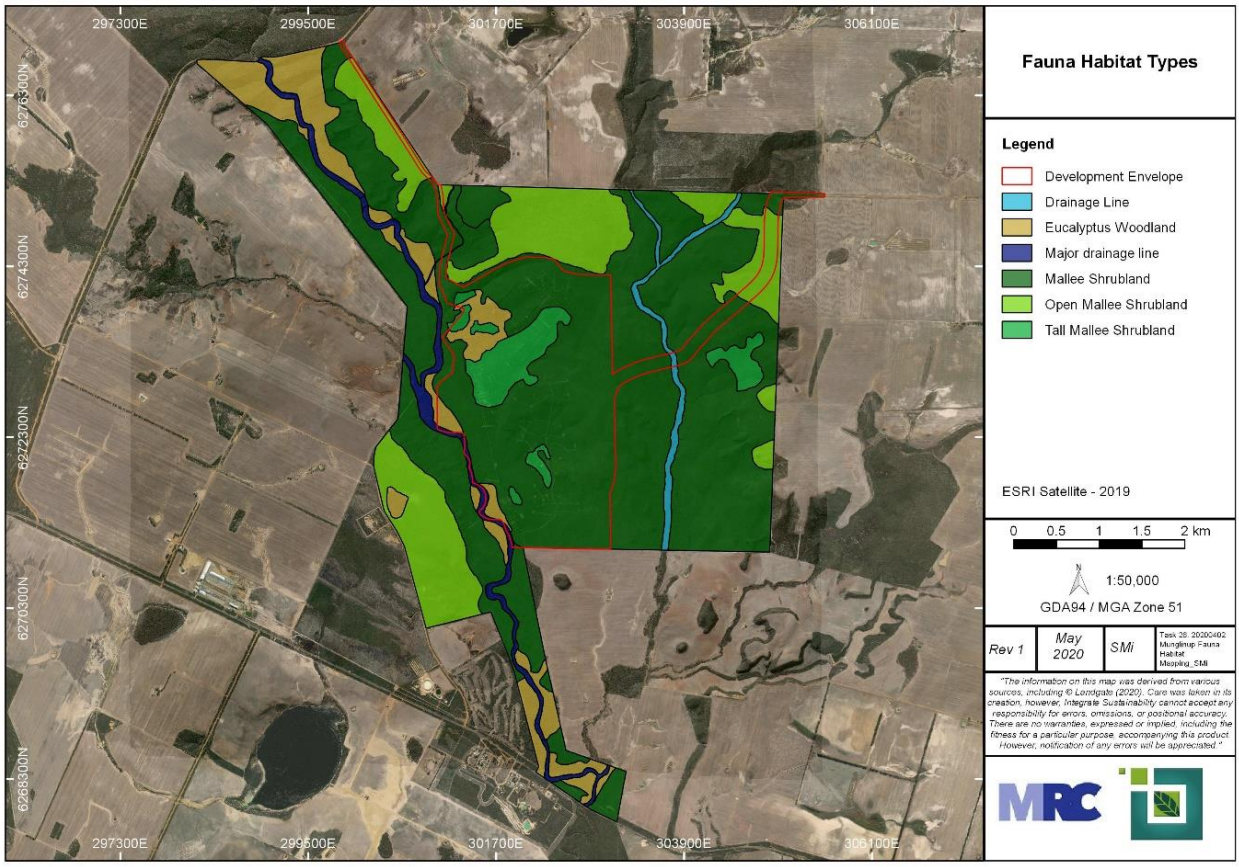


Figure 4-27 Study Area Fauna Habitat Types (Western Ecological, 2020a)

4.7.3 Conservation Significant Fauna Species

The search of threatened species database such as EPBC Protection Matters search, DBCA Threatened Fauna Database, DBCA Survey Returns Database using NatureMap, as well as the BirdLife Australia Database determined that 11 conservation significant fauna species have been recorded within a 30km buffer of the Project Area. These species include Carnaby's Cockatoo, Baudin's Cockatoo, Malleefowl, Chuditch, Quenda, Red-tailed Phascogale, Western Brush Wallaby, Tammar Wallaby, Western Mouse, Peregrine Falcon and Fork-tailed Swift. Of these, five have been recorded, two are considered Likely, one species is considered Possible and three species are considered Unlikely to occur (Western Ecological, 2020a).

These species were separated into four categories of Recorded, Likely, Possible, and Unlikely to occur (Table 4-15) and are presented in Figure 4-28. Based on the likelihood assessment, Quenda, Carnaby's Cockatoo, Malleefowl, Western Brush Wallaby and Western Mouse have been recorded within the development envelope. The Peregrine Falcon and the Fork-Tailed Swift are Likely to occur within the development envelope, however no critical habitat has been noted. It is Possible that Chuditch may use the area, however no signs or dens have been observed in the area since field work commenced in 2014. This is likely to be associated with the limited or unsuitable habitat within the Project Area. The Chuditch has good dispersal abilities and is known from historic records in the general area. The Baudin's Cockatoo, Tammar Wallaby and the Red-Tailed Phascogale are Unlikely to occur as no suitable habitat is present in the Project area, it is acknowledged that there is potentially suitable habitat nearby, however, the Study Area is outside of the species' known distribution (Western Ecological, 2020a).

Table 4-15 Conservation Significant Fauna Likelihood of Occurrence

Species	Status	Likelihood	Reasoning
Chuditch, Western Quoll (*Dasyurus geoffroii)*	VU	Possible	This species uses hollow logs, tree limbs, rocky outcrops and burrows for denning, with suitable areas within the Project Area sparse. Furthermore, only two records of Chuditch have been recorded within 30km of the Project Area, with the most recent occurring in 2001 (DBCA, 2018a). The Chuditch's large home range suggests that this species may use the Project Area for foraging or when dispersing, however it is less likely to utilise the area on a permanent basis for breeding and denning. The two previous records for this species within the region occurred on the South Coast, where the remnant vegetation is a lot more continuous.
Western Mouse (*Pseudomys occidentalis)*	P4	Recorded	Recorded. The individual mouse was captured at trap site 3 during the Western Ecological 2019 study. Potential habitat occurs within the shrubland communities within the Project Area.
Quenda, Southern Brown Bandicoot (*Isoodon obesulus fusciventer)*	P4	Recorded (not observe during the 2019 survey)	Recorded. Secondary evidence in the form of diggings were recorded in the 2018 survey and the 2015 survey. Suitable habitat for this species can be found in the major drainage line and low *Melaleuca* shrubland habitats identified by Ecologia.
Tammar Wallaby (*Notamacropus eugenii derbianus)*	P4	Unlikely	One very old record south of the Project Area from 1899. Unlikely to occur within the Project Area.
Western Brush Wallaby (*Notamacropus irma)*	P4	Recorded	Potential habitat is present in some areas of the Project Area; however, there have been no recent records of the Western Brush Wallaby in the region with the last record dated from the 1980s.
Peregrine Falcon *(Falco peregrinus)*	OS	Likely	Suitable foraging habitat for the Peregrine Falcon occurs throughout the Project Area. However, the habitats present provide low suitability for nesting by Peregrine Falcons.
Baudin's Cockatoo (*Calyptorhynchus baudinii)*	EN	Unlikely	This species was recorded in 2013 south of the Project Area at the Munglinup Golf Course. While there is foraging habitat present, the Project area is on the edge of the known distribution for this species and there is also only one known record of it in the region. It is unlikely that it is a regular visitor to the area and therefore unlikely to occur in the Project Area.
Carnaby's Cockatoo *(Calyptorhynchus latirostris)*	EN	Recorded	There are 65 records for Carnaby's Cockatoos within the region with a significant number being recorded in the last 10 years. None of the habitats present provide breeding opportunities for this species; however, there is suitable foraging habitat in the form of the Proteaceous Shrubland habitat. Carnaby's Cockatoo have been recorded in the Project Area since the completion of the field survey.
Malleefowl *(Leipoa ocellata)*	VU	Recorded (not observe since 2014)	One individual was recorded in the Project area in 2015 with six records previously within the region. No nests have been recorded within the Project Area, due to the vegetation being too dense,

Species	Status	Likelihood	Reasoning
			particularly in the mid story, to open with not enough cover and not enough leaf litter or too open with not enough vegetation cover or water was present or is often present. This species is likely to visit the Project Area for foraging.
Fork-tailed Swift *(Apus pacificus)*	Mi	Likely	Foraging habitat is present throughout the Project Area. This species was recorded within 30km of the Project Area in 2002 but is unlikely to utilise the area for breeding.
Red-tailed Phascogale *(Phascogale calura)*	CD	Unlikely	No Red-tailed Phascogales or their signs (scats and tracks) were observed while undertaking the habitat assessments during the Western Ecological 2019 field study. Of all assessed sites, none were deemed suitable for denning due to a lack of suitably sized hollows.

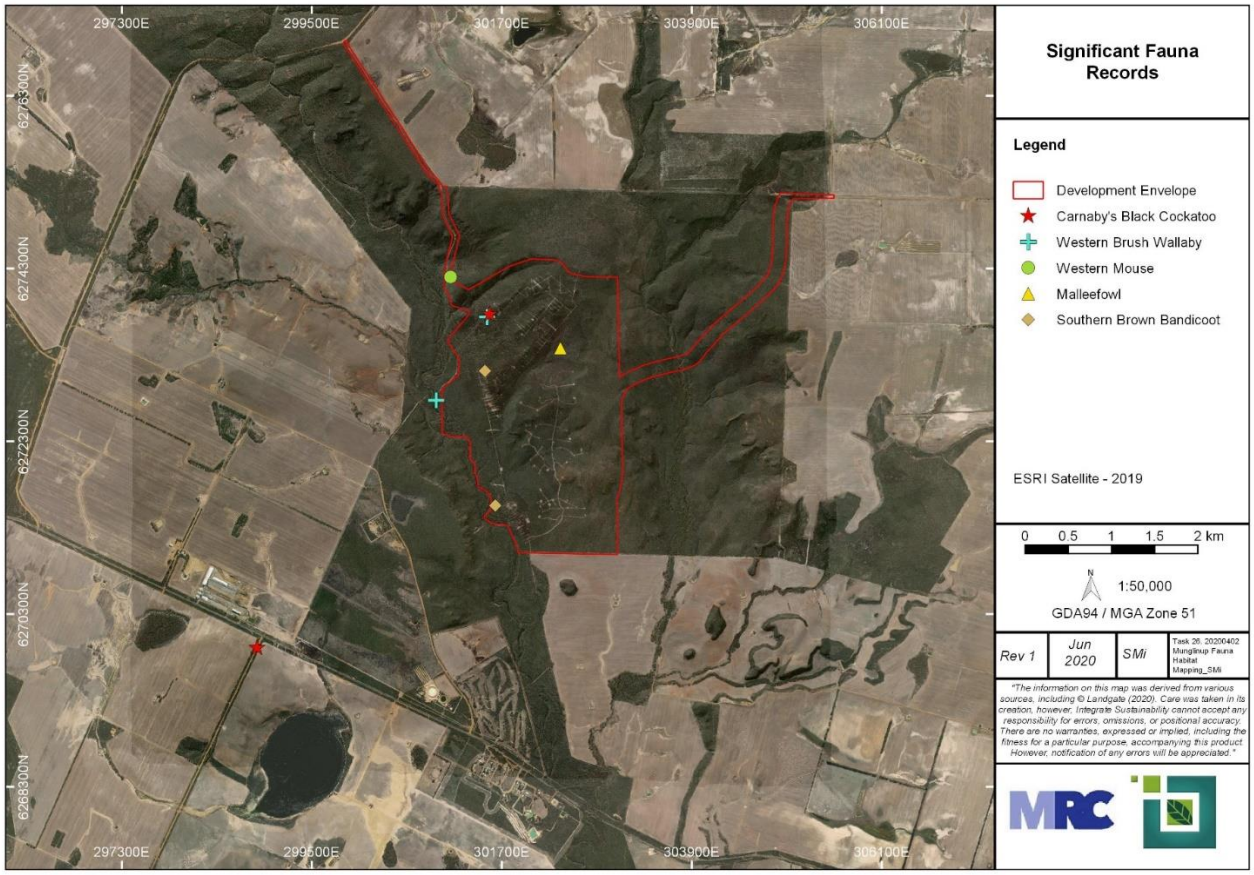


Figure 4-28 Conservation Significant Fauna Records and Sightings
(Ecologia Environment, 2015; Red Dog Environmental, 2018a; Western Ecological, 2020a)

4.8 Ecological Linkages

Since European Settlement in the south-west of WA, the condition and the extent of native vegetation has declined resulting in small patches of remnant vegetation in varying conditions (Bioplan, 2009). This has resulted in a fragmented landscape which reduces the availability of habitat and causes isolation for native flora and fauna populations (Bioplan, 2009). Fragmentation and habitat loss at the landscape scale have considerable impacts to the persistence of flora and fauna populations (Henle, et al., 2004; DoEE, 2012).

Along the south-coast, where the Project is located, approximately 50% of the original vegetation remains, albeit with a level of fragmentation (Gilfillan, et al., 2009). Landscape connectivity is recognised globally as an important factor in biodiversity conservation (Wilkins, et al., 2006). A proportion of the remnant vegetation in this region forms an important vegetation corridor, namely the 'Coastal Corridor' which spans 500km along the coast from Walpole and past Esperance (Gilfillan, et al., 2009). Remnant vegetation corridors located along the regional river systems, such as the

Munglinup River, link the 'Coastal Corridor' to other significant vegetation areas in the north of the region (Wilkins, et al., 2006).

Ecological linkages and corridors are networks of native vegetation that help maintain ecological functions, including movement of species and gene dispersal, across otherwise aforementioned fragmented landscapes. Corridors are generally linked vegetation, and linkages are often wide, non-linear and substantial cross-landscape networks (McQuoid & Neville, 2020). As all linkages in the Ravensthorpe-Esperenace Region have been identified as regionally important linkages, the Munglinup River Linkage has been assigned the status of 'Priority' (Wilkins, et al., 2006). To better understand the linkage values of the Munglinup River Coordor, McQuoid Ecology and Design and Ecotones Ltd were engaged to conduct an assessment of the ecological linkage values of the Oldfield River, Munglinup River and Young River Corridors (Figure 4-29) and the potential impact of the proposed mine development on the Munglinup Corridor (Appendix C-9). The objectives of the ecological linkages/ biodiversity impact assessment were to:

- Assess the importance of Munglinup River remnant vegetation corridor as an important corridor for the movement of flora and fauna between the coast and the Great Western Woodland;
- Assess the importance of the Munglinup Mining Reserve to known threatened species recorded in the region;
- Rate if the Munglinup River remnant vegetation corridor is more or less important than the Oldfield River or the Young River remnant vegetation corridors as a link between the Coast and the Great Western Woodland; and
- Determine whether the proposed Munglinup Graphite Project will directly or indirectly impact the ecological linkage values of Munglinup River remnant vegetation corridor or the Munglinup Mining Reserve and rate its significance.

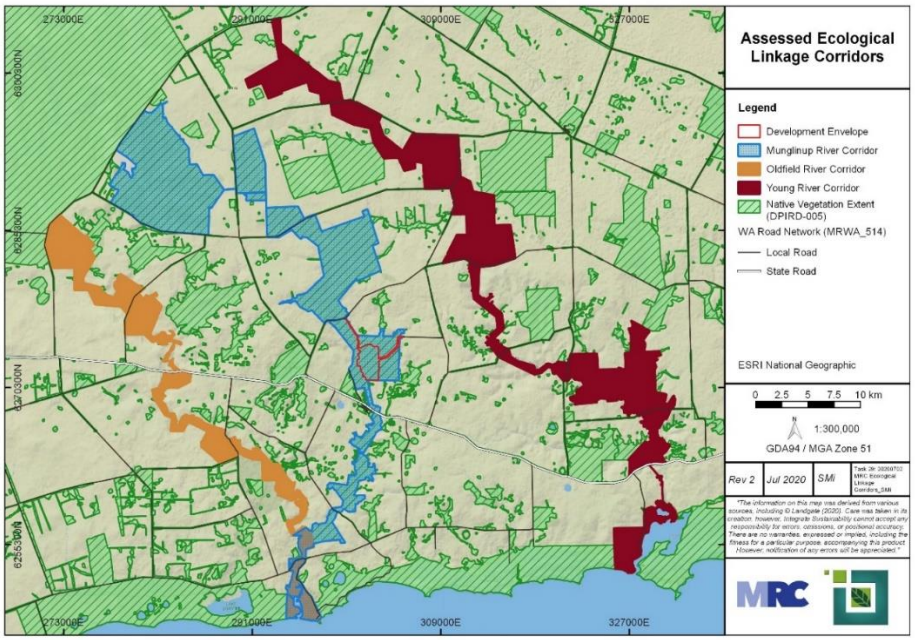


Figure 4-29 Regional Ecological Linkage Corridors

The ecological linkages assessment comprised a desktop review of previous ecological studies, surveys, records and literature to identify relevant assessment criteria. A subsequent field assessment and broad-scale vegetation and habitat mapping exercise then followed; culminating in a quantitative Multi Criteria Analysis Shell for Spatial Decision Support (MCAS-S) assessment of the predetermined criteria, field assessment data and broadscale vegetation maps.

The studies and data selected during the process informed the design and implementation of the field assessment; supported the MCAS-S analysis, and the evaluation of corridor use by fauna; and ultimately informed the development of potential management measures.

Due to the variability of data across the three corridors, the assessment considered, but did not use, the detailed survey data collected during the field assessment. That information was considered likely to bias the analysis and outcome of the assessment for the Munglinup Corridor, hence its exclusionBelow is a summary of assessment outcomes and a copy of the report is provided in Appendix C-9.

4.8.1 Desktop Study and Assessment Criteria

A desktop study was undertaken prior to commencement of field assessments and during the assessment and report development process, to:

- Consider foundational legislative and policy guidance;
- Support the methodical and safe undertaking of the field assessment;
- Review and develop aerial imagery and maps to support the field assessment;
- Review relevant previous ecological investigations of the Study Area;
- Consider Conservation Significant flora, fauna and ecological communities recorded in the Study Area;
- Review relevant corridor linkage studies;
- Review the use of MCAS-S in similar or related ecological studies;
- Consider any other relevant information that may assist the assessment; and
- Identify any information gaps that may exist.

The assessment was in accordance with relevant Environmental Protection Authority of WA (EPA) guidance statements (EPA, 2018b; EPA, 2016e; EPA, 2016b) and *EPBC Act* conservation advice and associated information (DAWE, 2020).

Aerial imagery mapped with combined road, hydrological data, and corridor linkage outlines assisted to determine the apparent vegetation types and habitat patterns visible and accessible by public access, and to select and locate relevé sites during the field assessment.

Delineated vegetation boundaries drawn on digital, geo-referenced versions of these maps, along with records of Conservation Significant flora, fauna and communities' locations were also included for use in the field.

Reviews of relevant ecological corridor linkage studies and associated information guided the MCAS-S analysis, including the development of assessment criteria. Further discussion of the desktop review assessment criteria is in section 4.8.3.

4.8.2 Field Assessment

The Oldfield and Munglinup River corridor linkage assessments were completed between 16-19 April 2020 (two days each); and the Young River corridor on May 8 and 9, 2020. An additional trip was undertaken on May 23, 2020 to access parts of the Young River corridor inaccessible on May 9, 2020. The field assessments of the three corridor linkages established the vegetation types and habitats present across the Study Area, and documented conservation significant flora, fauna and ecological communities (McQuoid & Neville, 2020).

Relevé sites were selected to capture the spread of representative vegetation types across the corridor linkages visible on the aerial imagery, able to be accessed from public roads and lands. Private property was not traversed to locate or access sites. Ecological data was recorded at the relevé sites across the three corridor linkages, including location, site number, site characteristics, vegetation structure and composition and condition, on field data sheets using the modified Perth Bushlands method (EPA, 2016b).

An additional factor of outlier plant communities was included in the assessment design. This community relates to a stand of Mangart or Jam Wattle (*Acacia acuminata*) occurring in the Study Area outlying its typical distribution to the west and north. These stands have conservation and cultural value, although are not listed as conservation significant (DBCA, 2018b), as such they were included as significant and to be mapped and used in assessment criteria.

During the field assessment occurrences of conservation listed flora and fauna were recorded at one site; the Kwongkan Shrublands of the Southeast Coastal Province Threatened Ecological Community at 22 sites and outlier stands of flora and vegetation types at three sites. Ten vegetation types/ habitats and their subtypes were identified during the field surveys and are presented in Table 4-17.

4.8.3 Quantitative Analysis of Physical and Biological Criteria

A literature review, the field assessment of the ecological corridor/ linkages, and biota related to the Study Area, informed the development of the linkage assessment criteria. These criteria included biological and physical values and considered the ecological integrity of the sites (EPA, 2018b) and vegetation characteristics (EPA, 2016b), resulting in a set of criteria for assessment of the biological/ecological and physical characteristics of each linkage.

The draft form assessment criteria supported the field assessment and the broadscale vegetation/ habitat mapping and were finalised during the MCAS-S analysis session on June 18 and 19 2020. An iterative process was followed to develop criteria classifications and weightings.

The final criteria used to assess the linkage values and the data sets chosen are listed and explained in Table 4-19.

Table 4-16 Composite Linkage Value Evaluation Criteria

Criterion/Focus	Values	Evaluation	Source
Physical Characteristics			
Overall Linkage			
Length of linkage	Measured length in m	Shorter is better for the overall movement of biota; better connectivity; relative values.	GIS analysis of shapefile
Area of Linkage	Measured length in ha	Larger is better for biological health and natural processes; relative values.	GIS analysis of shapefile
Average Width of Linkage	Length-weighted width in m	Wider is better for biological health and natural processes and for reducing external impacts; relative values.	GIS analysis of shapefile
Gaps	Measured length of gap along linkage axis in m	Shorter is better for the overall movement of biota; better connectivity; relative values.	GIS analysis of shapefile
Contiguous Patches of Vegetation			
Area	Measured length in ha	Larger is better for biological health and natural processes; better integrity.	GIS analysis of shapefile
Average Width	Length-weighted width for each patch of contiguous vegetation	Wider is better for biological health and natural processes and for reducing external impacts within the individual patch.	GIS analysis of shapefile
Exposure	Index of exposure	Larger number indicates better shape, better long-term capacity to maintain biological values and provide species refugia; and for reducing external impacts within the individual patch.	GIS analysis of shapefile
Biological Characteristics			
Naturalness			
Vegetation Condition	Community type Condition	Field assessment of multiple factors (and susceptibility) for that general community type - Vegetation and habitats; Presence of weeds; Presence of *Phytophthora* dieback; Burn history Assessed on a categorical scale: Pristine, excellent, very good, good, degraded, very degraded. Pristine is best.	Vegetation Survey
Weeds (Invasive Species)	Presence/ absence	Presence of invasive weeds, feral animal occurrence or *Phytophthora* dieback in specific community patch.	Vegetation Survey
Exposure	Distance to cleared land	Longer distance better (up to 500m). For any grid cell, longer distances represent relative absence of external impacts.	GIS analysis (Euclidean distance)

Criterion/Focus	Values	Evaluation	Source
Rarity			
Threatened Species	Presence/Absence/Likelihood	Field assessment of suitable habitat presence.	Vegetation Survey
Distance from threatened Flora	Proximity to collection	Distance in metres from rare and endangered flora – both State and Federal lists.	ISPL-supplied dataset (Master Threatened and Significant Flora and Fauna DBCA.shp)
Distance from threatened Flora	Proximity to collection/sighting	Distance in metres from rare and endangered fauna – both State and Federal lists.	
Community Rarity	Local Rarity of Community Type	GIS analysis of community area from Vegetation Survey – locally rare communities score higher	Vegetation Survey
Potential TEC	Presence/absence	Vegetation type and habitat constitutes the Kwongkan TEC.	Vegetation Survey
Diversity			
Diversity	Community Type Diversity	Essential conservation value criterion, surrogate for habitat complexity and niche opportunity.	GIS analysis of Community Type from Vegetation Survey

Finalised criteria were used in the MCAS-S analysis to assess each corridor linkage at both local and regional scales, compare corridor linkages, and to provide an evaluation of the Munglinup River corridor linkage status in the event of the proposed mine being developed (McQuoid & Neville, 2020).

A Least Cost Path (LCP) analysis was also used to evaluate the best link of the three pre-set choices of the Munglinup, Oldfield or Young Corridor. The LCP analysis was adapted for the Project to represent one way of assessing the most suitable linkage for movement of flora and fauna between the coast and the Great Western Woodlands.

4.8.4 Broadscale Vegetation and Habitat Mapping

Broadscale vegetation mapping was undertaken to identify habitats and their patterns of occurrence across the three corridor linkages, indicating the patterns of potential use by Conservation Significant species and Short-Range Endemic fauna.

The vegetation and habitat mapping was undertaken utilised previous mapping studies (Craig G.F, 2008), site relevé data, consideration of vegetation types and habitats by previous studies (Western Ecological 2020, Woodman Environmental 2020), and by extrapolation using available aerial imagery (EPA, 2016e). The broadscale approach was considered appropriate to identify the general range of vegetation types visible from available aerial imagery across the Study Area, from which to derive adequate vegetation maps.

Twenty-two vegetation types were identified using the results of the field assessment (Table 4-17) and aerial imagery to develop broadscale vegetation and habitat maps of the three corridors.

Table 4-17 Vegetation/ Habitat Types

Vegetation type/habitat	Code/No.	Condition	TEC	Outlier	No. locations
Mallet/moort woodland	MalMoWood 1	Pristine	No	No	6
Mallet/moort woodland	MalMoWood 1B	Excellent (burnt)	No	No	2
Melaleuca shrubland	MelShrub 2	Pristine	No	No	1
Melaleuca shrubland	MelShrub 2C	Degraded (grazed, cleared)	No	No	1
Tallerack kwongkan Proteaceae rich	TalKwonProt 3	Pristine	Yes	No	17
Tallerack kwongkan Proteaceae rich	TalKwonProt 3B	Excellent (burnt)	Yes	No	2
Tallerack kwongkan Proteaceae rich	TalKwonProt 3C	Good (Dieback)	Yes	No	1
Rock sheoak woodland	AlcasWood 4	Pristine	No	No	4

Vegetation type/habitat	Code/No.	Condition	TEC	Outlier	No. locations
Tallerack kwongkan	TalKwon 5	Pristine	No	No	7
Mallee shrubland	MalShrub 6	Pristine	No	No	10
Mallee shrubland	MalShrub 6B	Excellent (burnt)	No	No	3
Kwongkan shrubland	KwonShrub 7	Pristine	Yes	No	2
Kwongkan shrubland	KwonShrub 7B	Excellent	Yes	No	1
Swamp yate woodland	YateWood 8	Pristine	No	No	11
Swamp yate woodland	YateWood 8B	Excellent (weeds)	No	No	1
Mungart, jam woodland	JamWood 9	Excellent (weeds)	No	Yes	3
Granite shrubland	GranShrub 10	Pristine	No	Some	3

Condition was recorded at relevé sites (EPA, 2016b), and included in mapping where condition status was known (e.g. the presence of weeds, evidence of ground disturbance or recent fire, or could be seen using available aerial imagery).

The vegetation types and habitats present in the three corridors, in so far as they match those identified in the proposed mining area as preferred habitats by Woodman Environmental 2020, Western Ecological 2020 and Invertebrate Solutions 2020, were considered to be adequate indicators of the preference and presence of the Conservation Significant and Short-Range Endemic fauna.

4.8.5 Linkage Assessment Outcomes

Based on the biological and physical assessment of the three linkage corridors, the assessment determined the Oldfield, Munglinup and Young River corridors are important linkages between the coast and the Great Western Woodland. As a link between the coast and the Great Western Woodland, the Munglinup River remnant vegetation corridor is the largest of the three assessed corridor and has the highest linkage value.

The Munglinup River remnant vegetation corridor is important for the movement of flora and fauna between the coast and the Great Western Woodland due to the presence of a diversity of vegetation types, including the Kwongkan Shrubland of the Southeast Coastal Province Threatened Ecological Community and the outlier Jam wattle woodland; the range of habitats they form and the Conservation Significant and Short-Range Endemic fauna they are likely to support.

An analysis of previous studies, together with the field assessments undertaken by the ecological linkages study, found six species of Conservation Significant fauna and a number of Short-Range Endemic fauna are likely to use, and one species of Conservation Significant fauna may use, the three vegetation corridors due to the presence of suitable habitats. The Munglinup Mining Reserve is inhabited by a number of Threatened and other Conservation Significant species (four such species occur, and two others are likely use the area, and Threatened Ecological Communities because of the presence of the Kwongkan Shrubland of the Southeast Coastal Province Threatened Ecological Community, as identified by previous studies.

The proposed Munglinup Graphite Project, if implemented could clear up to 350ha within the Project development envelope of 650ha. This could directly impact the ecological linkage values of Munglinup River remnant vegetation corridor due to the removal of native vegetation for the mine; and indirectly impact the corridor due to isolation of the remaining native vegetation within the Munglinup Mining Reserve (approx. 1000ha). It will impact the natural values of Munglinup Mining Reserve directly due to vegetation and habitat removal, (including a threatened ecological community) and indirectly by reducing the area of the vegetation and increasing exposure, while also reducing the width of the corridor. The significance of the impact is rated as moderate, as it will reduce modelled values for the overall Munglinup Linkage by 10% of the modelled values, these values can be compared in Table 4-18 and Table 4-19.

Table 4-18 Results of Composite Linkage Value Pre-Mine

Linkage	Area (ha)	Composite Linkage Value		
		Sum	Max	Mean
Young River	17,379	1,499,512	1.36	0.86
Oldfield River	8,323	836,284	1.38	1.00
Munglinup River	**19,451**	**2,690,608**	**2.00**	**1.38**

Table 4-19 Results of Composite Linkage Value Post-Mine

Linkage	Area (ha)	Composite Linkage Value			
		Sum	Value % of Pre-Mine	Max	Mean
Young River	17,379	1,503,564	-	1.36	0.87
Oldfield River	8,323	832,413	-	1.38	1.00
Munglinup River	17,768	**2,468,671**	90%	2.00	**1.39**

The MCAS-S analysis is programmed to determine worst case scenario. The disconnection of the mining reserve through clearing for the project will be reduced by keeping the east of the mining reserve connected to the corridor through appropriate site layout design.

The results of the MCAS-S and LCP modelling indicated that of the three linkages, the Munglinup linkage had the highest linkage values and is the largest linkage area. The Young linkage had the next highest value; however, this is significantly lower than the Munglinup linkage. The LCP analysis showed that the Munglinup linkage is the preferred path from the coast to the Great Western Woodlands, with the Oldfield being a close second. Post mining, the LCP analysis favours the Munglinup linkage.

The impacts of the proposed Project could be mitigated by planning and implementing some management measures. Potential management measures including quality rehabilitation following mining and associated site damage, conservation arrangements with landholders, connecting ecological corridor linkage gaps, and improved conservation security for parts of the three ecological corridor linkages.

4.9 Short Range Endemic Invertebrate Fauna

Biota Environmental Sciences completed a pilot survey for SRE invertebrates for a portion of the MRC Graphite tenements in May 2018 (Biota Environmental Sciences, 2018a). The survey targeted three invertebrate groups pre-disposed to short-range endemism being; mygalomorph spiders (Mygalomorphae), millipedes (Diplopoda) and terrestrial snails (Pulmonata) (Biota Environmental Sciences, 2018a).

Assessment included twelve sites with habitat comprising suitable soil profiles, rock piles and drainage depressions that would support SRE species (Biota Environmental Sciences, 2018a). Survey included visual location of Mygalomorph spiders' burrows, searching under leaf litter and logs for millipedes; and land snails were targeted by locating dead snail shells and digging in drainage gullies and at the base of trees and shrubs.

Four potential SRE invertebrate fauna species were recorded, being three mygalomorph spiders and one terrestrial snail (*Bothriembryon dux*) (Table 4-20). Whilst the terrestrial snail is not considered a SRE, the SRE status of the mygalomorph spider is indeterminate due to species level not being identifiable (Biota Environmental Sciences, 2018a). Both *Aname* sp. *indet*. and *Proshermacha* sp. *indet*. specimens were located in Eucalypt Woodland, Mallee Shrubland and Proteaceous Shrubland habitats. Given the variation in habitats and the extent of these habitats outside of the development envelope, it is unlikely that these species are restricted within the Project area (Biota Environmental Sciences, 2018a). As only a single specimen of *Idiopididae* sp. *indet.* was recorded, conclusions on the habitat specificity of this taxon cannot be reached (Biota Environmental Sciences, 2018a). However,

this specimen was recorded within a habitat which is also present outside the development envelope and is unlikely to be restricted to the Project area.

The pilot survey did not include the entire development envelope (Figure 2-1) and provided inconclusive results as to the diversity and presence of potential and confirmed SRE species within the MRC Graphite tenements.

To address these gaps, Invertebrate Solutions was commissioned to undertake a level 2 SRE survey in October 2019. The 2019 survey area aligned with the Terrestrial Fauna survey area (Western Ecological, 2020a). The survey involved field sampling for SRE through active searching, leaf litter collection and opportunistic collection (Invertebrate Solutions, 2020a). The surveys sites were chosen to maximise SRE habitat including south-facing slopes, gullies, rocky outcrops, dence patches of trees and permanent water bodies (Invertebrate Solutions, 2020a). These habitats were selected from previous vegetation mapping for the Development Envelope, the results of the previous SRE survey and to provide spatial spread of survey locations through the Survey area.

Dry pitfall trapping was undertaken as part of the Western Ecological Level 2 – Terrestrial Fauna survey, in which no potential SRE invertebrates were recorded. Summaries of the findings of each of these studies are provided in the sections below. Copies of the SRE Fauna Report and the Impact Assessment Memo can be found in Appendix C-10 and Appendix C-11 respectively.

4.9.1 Assemblage

The SRE field survey (Invertebrate Solutions, 2020a) recorded 247 individual specimens representing 25 taxa of invertebrates from six classes, 11 orders and 19 families that have the potential to contain SRE taxa. No Confirmed SRE species were recorded during the field survey. A desktop study was undertaken for potential SRE within the survey area and compared to those that were identified in the 2018 Biota destop survey (Table 4-20).

Of the specimens recorded, there were 14 potential SRE invertebrate species from within the Survey Area as highlighted in green Table 4-21 (Figure 4-30). These 14 taxa included no Confirmed SRE species, four Likely SRE species and 10 Possible SRE species, the possible species are presented in Figure 4-31. The majority of the species determined to be Possible SRE taxa were due to incomplete taxonomy and unknown species distributions. All the Possible SRE species are known to occur more widely in the region or were often recorded at multiple locations during the survey indicating that their distributions are wider than the current survey could determine (Invertebrate Solutions, 2020a).

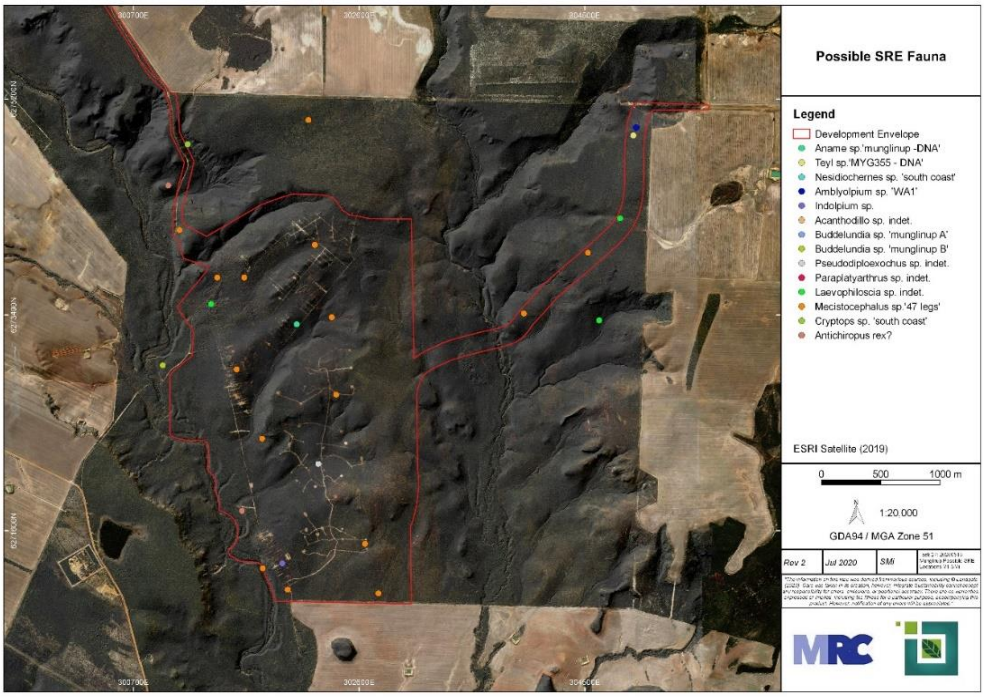


Figure 4-30 Possible SRE Invertebrate Fauna Records

Table 4-20 Potential Short Range Endemic Species – Database Search Results of the Desktop Area

(Biota Environmental Sciences, 2018a; Invertebrate Solutions, 2020a)

Higher Order		Genus and Species	Source of Record		SRE Status	Likelihood of Occurrence in Study Area
			Biota 2018	WAM		
Mollusca: Gastropoda	Bothriembryontidae	*Bothriembryon balteolus*	✓		Widespread	Moderate
		Bothriembryon bradshawi	✓		Possible	Moderate
		Bothriembryon dux	✓	✓	Widespread	High
		Bothriembryon aff. praecelsus	✓		Possible	Moderate
		Bothriembryon melo	✓		Widespread	Moderate
		Bothriembryon cf. rhodostomus	✓		Unknown	Low
	Pupilidae	*Gastrocopta cf. margaretae*	✓		Unknown	Low
	Succineidae	*Succinea scalanina*	✓		Widespread	Moderate
Arachnida: Mygalomorphae	Barychelidae	*Synothele rastelloides*	✓		Widespread	Moderate
	Idiopidae	*Bungulla fusca*	✓	✓	Confirmed	High
		Eucanippe bifida	✓		Confirmed	Moderate
		Gaius hueyi	✓	✓	Confirmed	High
		Idiopidae sp. indet.	✓	✓	Possible	High
	Nemesiidae	*Aname mainae*	✓	✓	Widespread	High
Arachnida: Pseudoscorpiones	Chthoniidae	*Lagynochthonius australicus*	✓	✓	Widespread	High
	Scorpiones	*Urodacus novaehollandiae*		✓	Widespread	High
Diplopoda:	Paradoxosomatidae	*Antichiropus rex*	✓	✓	Likely SRE	Moderate
	Julidae	*Ommatoiulus moreleti*	✓	✓	Widespread	High

Table 4-21 Potential SRE Invertebrates Liklihood of Occurrence in the SRE Survey Area

Higher Order		Genus and Species	Collection Records and known distributions		Recorded During 2019 Survey		SRE Status	Likelihood of Occurrence in Study Area
			Biota 2018 Recorded	WAM or published known distributions	Within Development Envelope	Outside the Development Envelope		
Mollusca: Gastropoda	**Bothriembryontidae**	*Bothriembryon bradshawi*	No	Stirling Ranges to Munglinup	No	No	Possible (A)	Moderate
		Bothriembryon aff. praecelsus	No	11 km NE of survey area in remnant Eucalyptus open mallee shrubland.	No	No	Possible (A)	Moderate
Crustacea: Isopoda	**Armadillidae**	*Acanthodillo sp. indet*	No	Survey Area	No	Yes	Likely	Present
		Buddelundia sp. 'munglinup A'	No	Survey Area	Yes	Yes	Possible (A)	Present
		Buddelundia sp. 'munglinup B'	No	Survey Area	Yes	Yes	Possible (A)	Present
		Pseudodiploexochus sp. indet.	No	Survey Area	Yes	No	Likely	Present
	Paraplatyarthridae	*Paraplatyarthrus sp. indet*	No	Survey Area	Yes	No	Likely	Present
	Philosciidae	*Laevophiloscia sp. indet*	No	Survey Area	Yes	Yes	Possible (A)	Present
	Idiopidae	*Bungulla fusca*	Rix et al. 2018a	Munglinup to Coolinup in open Eucalyptus mallee shrubland	No	No	Confirmed	High
		Eucanippe bifida	Rix et al. 2018a	Ravensthorpe to Cape Arid in open Eucalyptus mallee shrubland	No	No	Confirmed	Moderate

Higher Order		Genus and Species	Collection Records and known distributions		Recorded During 2019 Survey		SRE Status	Likelihood of Occurrence in Study Area
			Biota 2018 Recorded	WAM or published known distributions	Within Development Envelope	Outside the Development Envelope		
		Gaius hueyi	WAM record / *Rix et al*. 2018c	Ravensthorpe to point Dempster.	No	No	Confirmed	High
		Idiopidae sp. indet	Biota 2018	Survey Area	No	No	Possible (A)	Present
	Anamidae	*Aname sp.'munglinup-DNA'*	No	Survey Area	Yes	No	Possible (A)	Present
		Teyl sp .'MYG355 – DNA'	No	Waychinicup to Munglinup	Yes	No	Possible (A)	Present
Arachnida: Pseudoscorpiones	**Garypinidae**	*Amblyolpium sp. 'WA1'*	No	Ravensthorpe to Munglinup	Yes	No	Possible (A)	Present
	Chernetidae	*Nesidiochernes sp. 'south coast'*	No	Ravensthorpe to Munglinup	Yes	No	Possible (A)	Present
	Olpiidae	*Indolpium sp.*	No	Insufficient taxonomy	Yes	No	Possible (A)	Present
Chilopoda: Geophilomorpha	**Mecistocephalidae**	*Mescitocephalus sp.'47 legs'*	No	Insufficient taxonomy	Yes	Yes	Possible (A)	Present
Chilopoda: Scolpendromorpha	**Cryptopidae**	*Cryptops sp. 'south coast'*	No	Insufficient taxonomy	Yes	No	Possible (A)	Present
Diplopoda: Polydesmida	**Paradoxosomatidae**	*Antichiropus rex?*	No	Munglinup to Grass Patch	Yes	Yes	Likely	Present

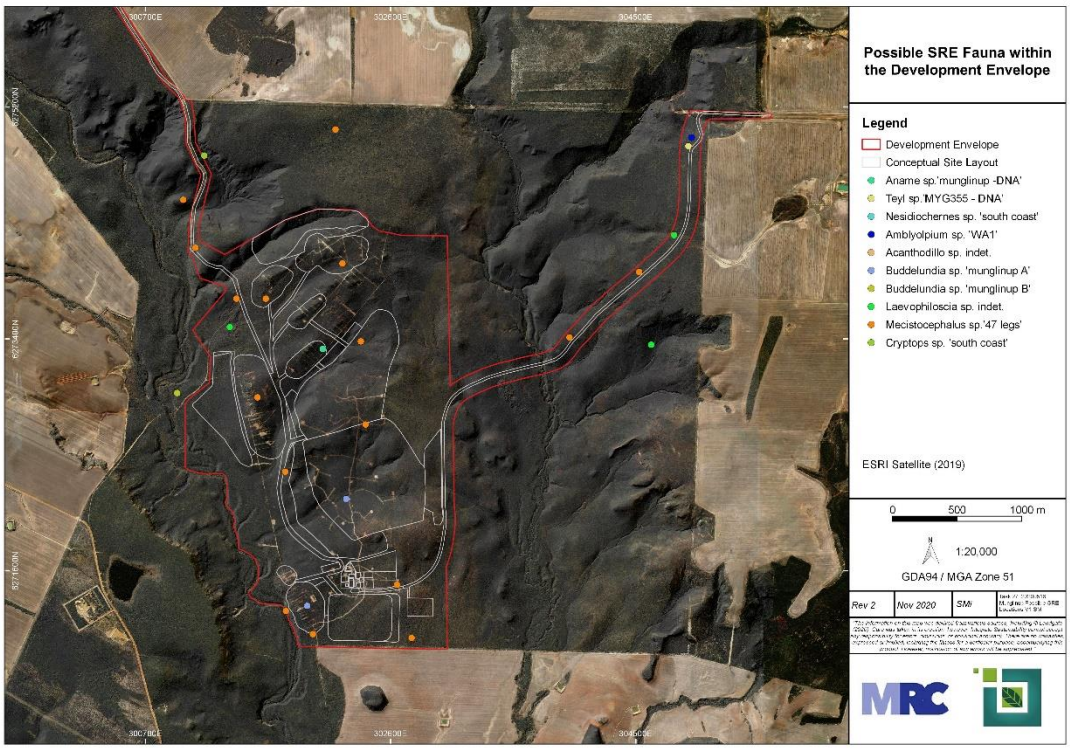


Figure 4-31 "Possible" SRE within the Development Envelope

Table 4-22 Short Range Endemic Fauna Recorded from the Study Area.

(Biota Environmental Sciences, 2018a; Invertebrate Solutions, 2020a)

Invertebrate Group/ Family	Taxon	SRE Status	Biota 2018	Invertebrate Solutions 2019
Arachnids -Spiders				
Nemesiidae	*Aname sp. indet.*	Possible	✓	
Nemesiidae	*Proshermacha sp. indet.*	Widespread	✓	
Nemesiidae	*Teyl sp.*	Widespread		✓
Idiopidae	*Idiopidae. sp. indet.*	Indeterminate	✓	
Barycheilodae	*Synthele rastelloids*	Widespread		✓
Arachnids -Pseudoscorpions				
Garypinidae	*Amblyolpium sp.*	Possible		✓
Geogarypidae	*Geogarypus taylori*	Widespread		✓
Chernetidae	*Nesidiochernes sp. 'south coast'*	Possible		✓
Olpiidae	*Indolpium sp.*	Possible		✓
Arachnids -Scorpions				
Urodacidae	*Lychas sp.'austroccidentalis'*	Widespread		X
Land Snails				
Placostylidae	*Bothriembryon dux*	Not an SRE	✓	
Placostylidae	*Bothriembryon balteolus*	Widespread	✓	✓
Bothriembryontidae	*Insullaoma predicta*	Widespread		✓
Isopods – Crustaceans				
Armadillidae	*Acanthodillo sp. indet.*	Likely		✓
Armadillidae	*Buddelundia sp 'munglinup A'*	Possible		✓
Armadillidae	*Buddelundia sp 'munglinup B'*	Possible		✓
Armadillidae	*Pseudodiploexochus sp. indet.*	Likely		✓
Paraplatyarthridae	*Paraplatyarthrus sp. indet.*	Likely		✓
Philosciidae	*Laevophiloscia sp. indet.*	Possible		✓
Centipedes				
Henicopidae	*Lamyctes africanus*	Widespread		✓
Mecistocephalidae	*Mescitocephalus sp.'47 legs'*	Possible		✓

Invertebrate Group/ Family	Taxon	SRE Status	Biota 2018	Invertebrate Solutions 2019
Cryptopidae	*Cryptops sp. 'south coast'*	Possible		✓
Scolopendridae	*Scolopendra laeta*	Widespread		✓
Millipdes				
Paradoxosomatidae	*Antichiropus rex?*	Likely		✓
Polyxenidae	*Unixenus mjobergi*	Widespread		✓
Insects				
Tettigonidae	*Pachysaga croceopteryx*	Widespread		✓

Every Likely SRE species was recorded solely from leaf litter extracted in Tullgren funnel samples except for the single dead specimen of *Antichiropus rex?* that was recorded during active searching of leaf litter, however, juvenile specimens of *Antichiropus rex?* were recorded at a different site in leaf litter extracted in Tullgren funnel samples. The Likely SRE species were recorded within the laterally continuous Mallee Shrubland or Eucalyptus Woodland habitats, with only a single specimen of the Likely SRE isopod species *Acanthodillo sp. indet*. recorded from the Proteaceous Kwongkan Shrubland habitat (Invertebrate Solutions, 2020a).

The majority of species recorded are widespread across the southern coast or the south west of Western Australia.

4.9.2 Conservation Significant Species

A list of conservation significant fauna for the buffer area was compiled from the DBCA Specially Protected Fauna Notice 2019 and the DAWE's Protected Matters Search Tool (PMST). SRE species that are listed under the *BC Act* and/or the *EPBC Act* and are likely to occur, or have known habitat within the Desktop Study Area, are shown in Table 4-23 along with their conservation status.

The PMST results listed no known SRE or conservation significant invertebrate fauna within 50km of the Project area.

Table 4-23 Conservation Significant Invertebrates Potentially within the Desktop Study Area

Higher Classification	Genus and Species	DBCA/ BC Status	EPBC status	Probability of occurrence
Insecta: Hymenoptera	*Glossurocolletes bilobatus*	Priority 2	-	Low
	Hylaeus globuliferus	Priority 3	-	Low

4.10 Subterranean Fauna

In May 2018, Biota Environmental Services undertook a desktop review of subterranean fauna within the Project area, along with a pilot field study where sampling and trapping was undertaken for stygofauna and troglofauna.

The likelihood of stygofauna and troglofauna occurring in the Study Area were assessed using a combination of regional information and site-specific habitat data including surface geology, hydrogeological information, drill hole information from within the Study Area and location of past subterranean fauna records (Biota Environmental Sciences, 2018b).

Database searches undertaken to identify potential subterranean fauna within the region included the Biota internal database, NatureMap, Atlas of Living Australia, EPBC Protected Matters Search Tool and the Western Australian Arachnida and Myriapoda, Mollusca and Crustacea databases. A 40km buffer was used with searches targeting Arachnida, Myriapoda, Mollusca and Crustacea. Searches returned no record of troglofauna or stygofauna taxa within the search area (Biota Environmental Sciences, 2018b).

Following the database review in May 2018, the subterranean fauna traps were recovered in July 2018. Stygofauna were sampled from seven sites using modified plankton haul nets, with nets lowered to the bottom of the surveyed drill holes before being slowly hauled through the water

column to the surface. Each site was sampled in this way a total of four times. No stygofauna were recorded from any of the seven sites sampled (Biota Environmental Sciences, 2018b). Troglofauna were sampled from eleven sites using two methods; baiting colonisation traps and scraping, with traps recovered after seven weeks. No troglofauna were recorded from any of the eleven sites sampled, although 1,249 surface invertebrate specimens were collected within the traps (Biota Environmental Sciences, 2018b).

The sampling results were supported by the geology of the Project area, as seen from drill cores, which indicate a scarcity of vugs, fractures or cavities (Biota Environmental Sciences, 2018b). These are structural features typically present in subterranean fauna habitat, and as such it is unlikely that the rock types present in the Study Area represent habitat for troglofauna or stygofauna (Biota Environmental Sciences, 2018b). The 2016 Technical Guidance 'Subterranean Fauna Survey' outlines there is a low likelihood of suitable habitat to support subterranean fauna when there are a lack of voids or fractures (EPA, 2016f). The results of the Biota pilot study support a low likelihood of occurrence of subterranean fauna.

4.11 Aquatic Fauna

The South Coast Region contains over 100 rivers and major tributaries which are perennial or ephemeral in nature (Cook, et al., 2008). There are two broad aquatic bioregions which are recognised in the South Coast region, these being the Western South Coast bioregion and the Eastern South Coast bioregion (Cook, et al., 2008). The Munglinup Graphite Project and associated tenure is located adjacent to the Munglinup River. The Munglinup River falls within the Eastern South Coast aquatic bioregion. The Munglinup River has a catchment of approximately 32,300ha and is a major tributary of the Oldfield River, the two rivers meet 13km southwest of Munglinup (Gee & Simons, 1997).

In April 2018, Wetland Research Management completed a baseline assessment (Appendix C-12) to examine water quality and aquatic fauna along the Munglinup River (Wetland Research and Management, 2018). A desktop assessment was also undertaken by WRM in May 2018 (Wetland Research and Management, 2018a) in order to document known water quality and aquatic fauna valuea of the Munglinup River. The purpose of the studies was to understand the importance of a range of ecological values in the pools in the Munglinup River, and the local/regional distribution of the values. (Figure 4-32).

The in-stream habitat at Munglinup River was typically dominated by large woody debris, trailing vegetation, leaf litter and mineral substrate. Like the substrate characteristics, diversity of the in-stream habitat was typically homogenous upstream and downstream of the Project area. It was also noted that there was a lack of aquatic macrophytes at all but one sampling point. This being site MRD4, which recorded 20% coverage of submerged aquatic grass (*Ruppia sp*) (Wetland Research and Management, 2018).

The water quality of the Munglinup River was assessed both during the field survey, for electrical conductivity, pH, dissolved oxygen and temperature, and through laboratory analysis for turbidity, ionic composition, alkalinity, nutrients and dissolved metals. The results consider the water quality to be saline, alkaline, clear and well oxygenated; and is comparable to other rivers in the region (Wetland Research and Management, 2018).

The Munglinup River has a relatively low diversity of macroinvertebrate fauna and no State or Federal listed macroinvertebrate species of conservation significance have been recorded. A total of 46 macroinvertebrate taxa have been recorded from the Munglinup River. The majority of the taxa recorded are considered salt tolerant, common and ubiquitous species with distributions extending across southern Australia (Wetland Research and Management, 2018). It was noted that Dragonfly and damselfly, Stone fly and mayflies were all absent from the insect assemblage of the survey. These fauna groups are often considered sensitive receptors of freshwater environments, and their absence suggests background salinity likely exceeds tolerances (Wetland Research and Management, 2018).

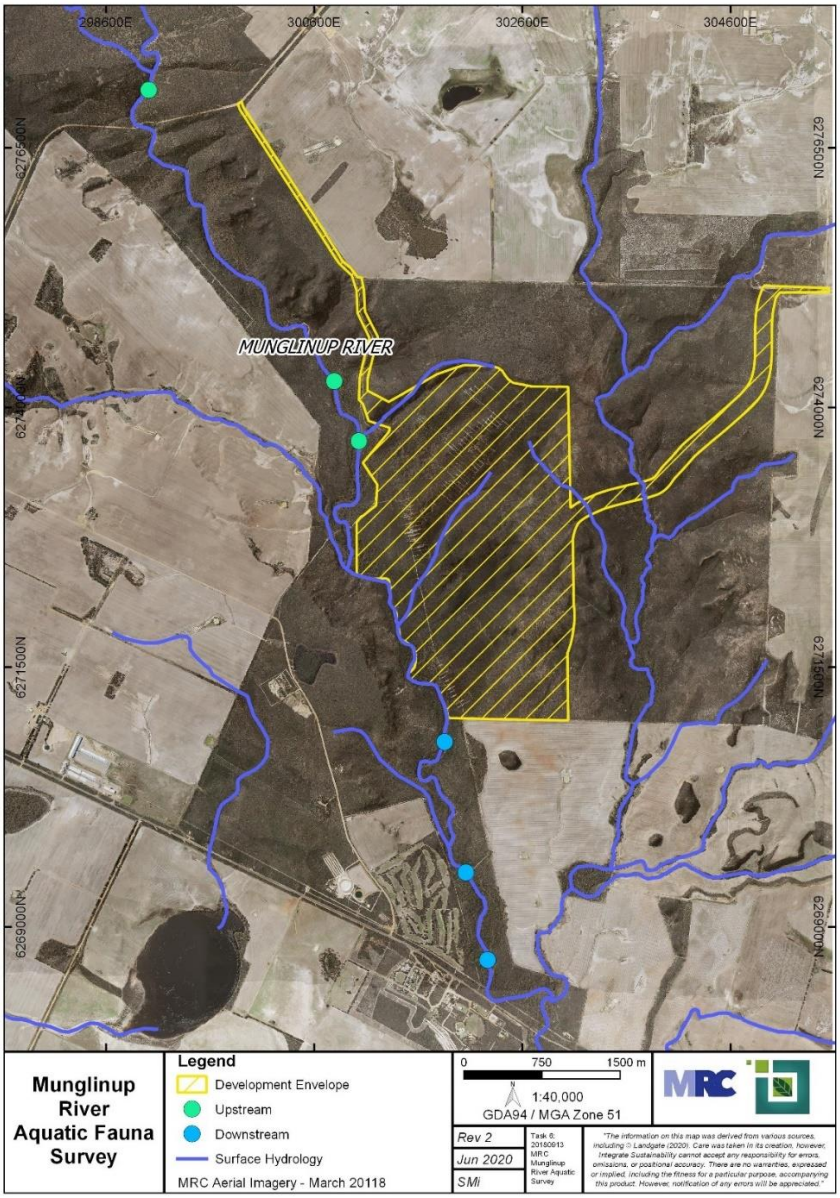


Figure 4-32 Munglinup River Sampling Sites

A total of three fish species were recorded in the Munglinup River, these being the Swan River Goby (*Pseudogobius olorum*), Common Jollytail Minnow (*Galaxias maculatus*) and the Western Hardyhead (*Leptatherina wallacei*). None of these species are listed as conservation significant, nor are they endemic to the region. These fish species are all salt tolerant and widely distributed in inland rivers along the South Coast (Wetland Research and Management, 2018).

No native or introduced crayfish species were recorded within the Munglinup River adjacent to the Project area. Munglinup River also does not appear to support other vertebrate aquatic fauna of conservation significance, specifically freshwater turtles and/or water rats. For the latter, this may be an artefact of a lack of an abundant and diverse food source, with no freshwater mussels or crayfish recorded. There is potential for opportunistic bird use in areas where vegetation is healthy and is suitable for foraging and/or nesting; however, the system is unlikely to provide significant habitat for conservation significant species in a local or regional setting. No native frog species were observed during sampling or confirmed from playing audio calls at each site. (Wetland Research and Management, 2018).

Salinity, and to a lesser degree nutrient enrichment, appear to be the main factors influencing the diversity and composition of aquatic fauna in this system and is typical of surrounding rivers of the Eastern South Coast bioregion. However, Munglinup River is considered of moderate regional

conservation value, supporting healthy aquatic fauna and flora, and as such present as a relatively undisturbed system. Diversity of macroinvertebrates and fish is comparable to that recorded at nearby naturally salinized river systems east of the Pallinup River (Wetland Research and Management, 2018).

4.12 Social Surrounds

4.12.1 World and National Heritage

There are no declared World Heritage or National Heritage Places within the development envelope or the surrounding area. The closest National Heritage Place is the Fitzgerald River National Park 80km from the Project. The implementation of the Project will not have an impact on the Fitzgerald River National Park.

4.12.2 Native Title

The Project is located within the Esperance Nyungar Native Title determination area (WCD2014/002), which covers a large portion of the South-Coast. During the Native Title determination process, it was determined that Native Title had been extinguished within Mining Reserve R24714 and Reynold Road Easement (Table 4-24).

Table 4-24 Summary of Native Title

Name	Tribunal File No.	Determination Date	Registered Native Title Body Corporate
The Esperance Nyungars	WCD2014/002	17/03/2014	Esperance Tjaltjraak Native Title Aboriginal Corporation (Esperance Nyungar)

4.12.3 Aboriginal Heritage

In 2018, Applied Archaeology Australia and representatives from the Esperance Nyungars were engaged to undertake an ethnographic and archaeological survey of the Project area (Applied Archaeology Australia, 2018). The survey identified five archaeological places and two ethnographic places.

The archaeological places identified consisted of artefact scatters and ochre sources, with an additional 35 isolated finds including a kodj (axe), a grinding stone and a number of artefacts also identified across the survey area.

The ethnographic cultural places identified consisted of two interconnected places, being the Munglinup River and the associated rocky outcrop, which was referred to by the Elders on the survey as Mungan Wilgie Koort. There are three registered Aboriginal heritage places within the development envelope (Table 4-25).

Table 4-25 Summary of Registered Sites

Name	ID	Status	Type	Restrictions	Protected
Mungan Wilgie Koort	37631	Registered Site	Artefacts/ Scatter, Mythological, Natural Feature	-	No
Munglinup River	37695	Registered Site	Mythological	-	No
Munglinup Standing Stone	37798	Registered Site	Artefacts/ Scatter	-	No

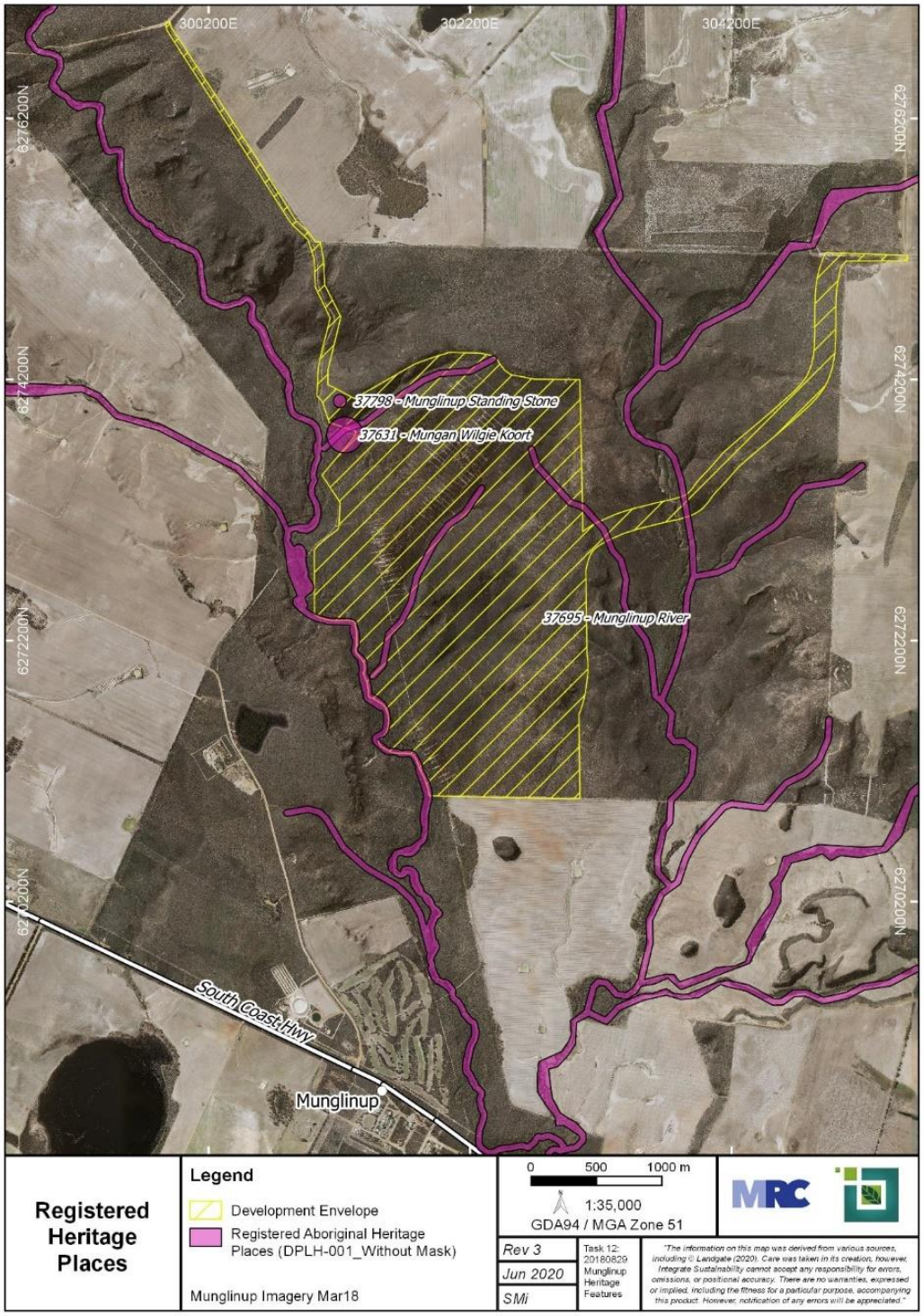


Figure 4-33 Registered Aboriginal Heritage Sites

A Ministerial consent under section 18 (s18) of the *Aboriginal Heritage Act 1972* (WA) was granted to use Mining Tenement M74/245, Reserve 24714 and Reynolds Rd for the purpose of further exploration drilling, leading in stages to the development open cut mines and associated facilities for the mining of graphite over a 15-year lifespan. The consent includes the development of six graphite deposits as open pit mines and associated facilities, waste rock landforms, tailings storage facilities, processing plant, run of mine low-grade stockpile, workshops and administrative buildings and haul and LV roads.

Prior to any works commencing, MRC Graphite will provide an opportunity for the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) to conduct cultural salvage on any or all Aboriginal sites listed in Table 4-25 as per the section 18 conditions.

4.12.4 Social Setting & Land Use

The Project is located near the border of the Esperance and Ravensthorpe Shires (Figure 1-1). The development envelope is solely located within the Shire of Esperance. MRC Graphite tenure extends across both the Shire of Esperance and the Shire of Ravensthorpe.

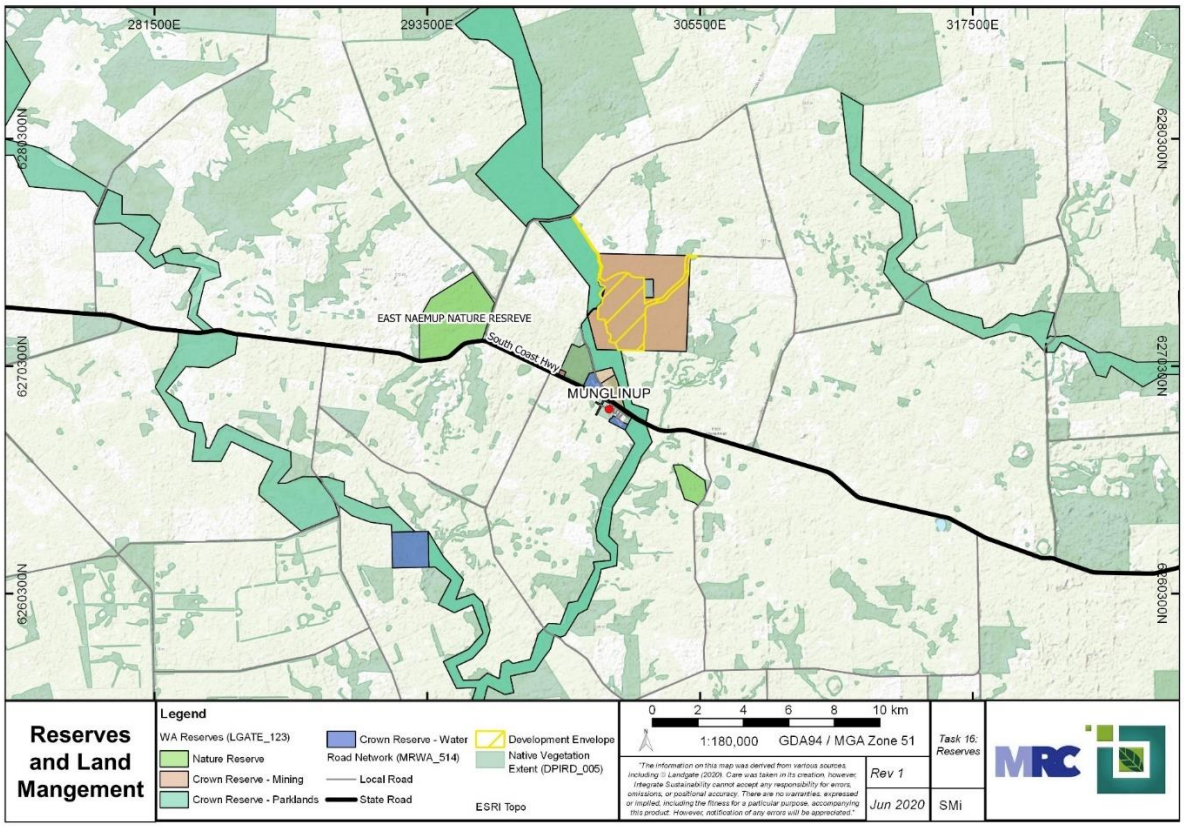


Figure 4-34 Conservation Estate and Surrounding Reserves

The closest town to the Project is Munglinup, located approximately 4km to the south of the Project. The regional towns of Esperance and Ravensthorpe are located 105km and 85km from the Project respectively. The region was first utilised for agriculture in the late 1950s, with the area surrounding the Project now dominated by sheep, wheat and cereal crop farming. The Munglinup townsite (gazetted in 1962) is a grain receival site for Cooperative Bulk Handling (CBH) Group.

No DBCA managed lands intersect the Project area, although there are two conservation reserves within 10km, these being the East Naemup Nature Reserve (5km west) and the Munglinup Reserve (7km south), as shown in Figure 4-34.

The development envelope is located entirely within Mining Reserve R24714, with the western boundary adjacent to Parklands Reserve R30869 (Figure 4-35). Other crown reserves within close proximity to the Project area are detailed in Table 4-26.

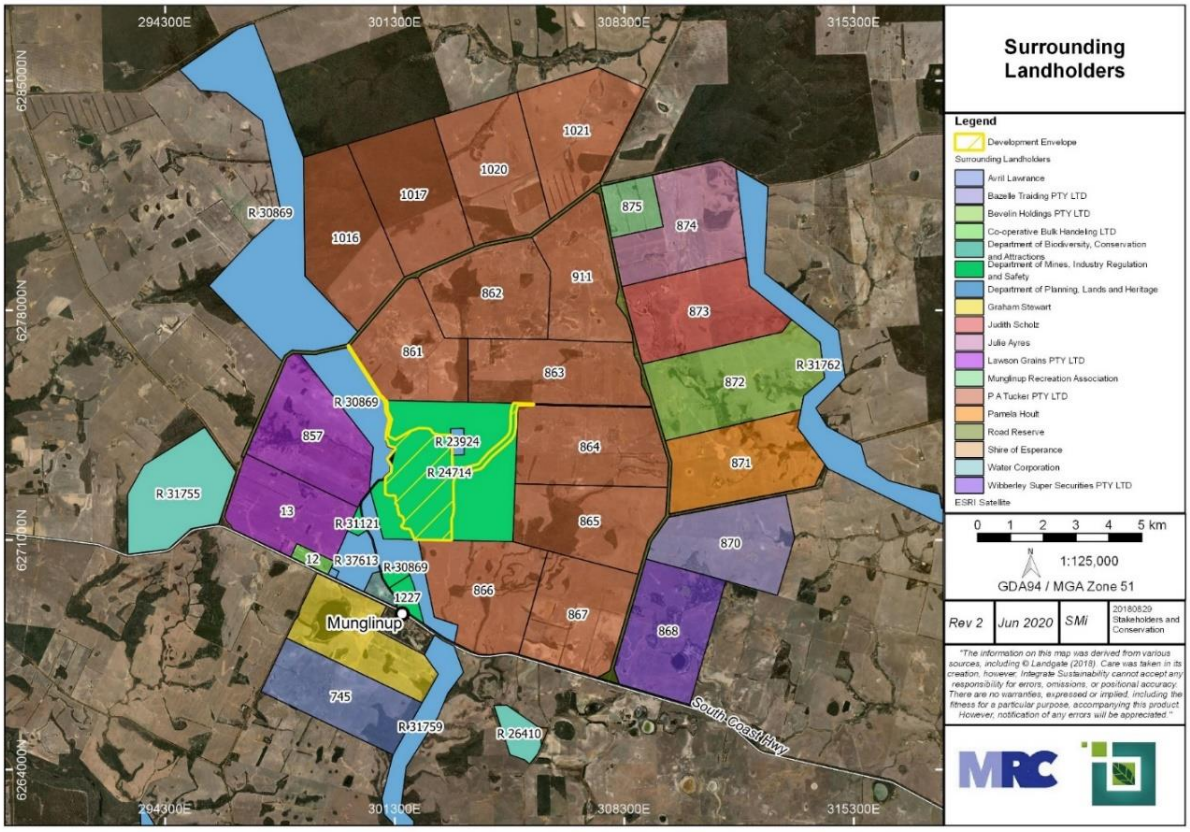


Figure 4-35 Project Area Surrounding Landholders

Table 4-26 Summary of Surrounding Reserves

Lot Name	Reserve Purpose	Responsible Agency
R 30869	Parklands	Department of Planning, Lands and Heritage
R 37613	Landing Ground	Department of Planning, Lands and Heritage
R 31121	Rubbish Disposal Site	Department of Planning, Lands and Heritage
R 30489	Recreational Golf Course	Department of Planning, Lands and Heritage
R 31345	Cemetery	Department of Planning, Lands and Heritage
R 30488	Water Supply	Water Corporation
R 35617	Water Supply	Department of Planning, Lands and Heritage
R 24714	Mining	Department of Mines, Industry Regulation and Safety
R 23924	Mining Timber	Department of Planning, Lands and Heritage
R 31755	Conservation of Flora and Fauna	Department of Biodiversity, Conservation and Attractions
R 26410	Conservation of Flora and Fauna	Department of Biodiversity, Conservation and Attractions

Herring Storer Acoustics were commissioned by MRC Graphite to study noise emissions from the Project on the nearest noise sensitive premises (see Figure 4-36), (Herring Storer Accoustics, 2018)(Appendix C-13). The assessment concluded the project will comply with the requirements of the *Environmental Protection (Noise) Regulations 1997 (WA)* based on the Project information provided for the assessment.

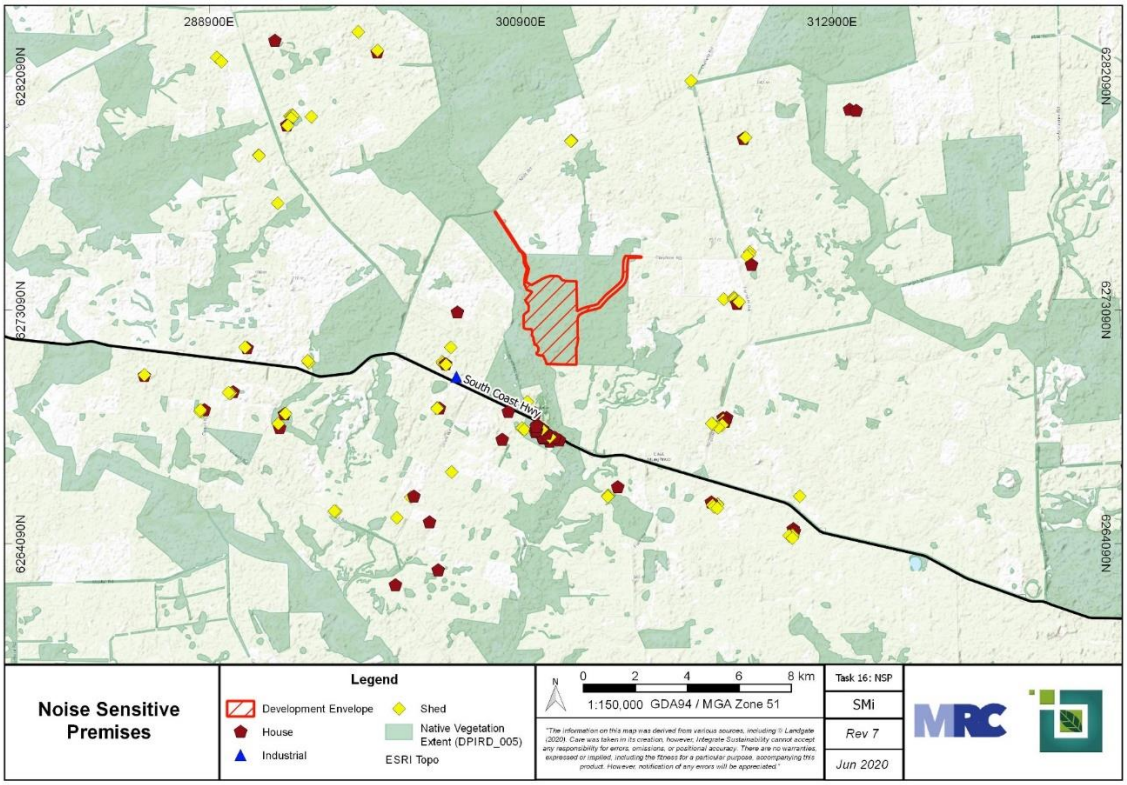


Figure 4-36 Project Area Potential Noise Sensitive Receptors

5 Environmental Principles & Factors

5.1 EPA Principles

There are five principles which guide the overall application of the *Environmental Protection Act 1986 (WA)*. The EPA has also adopted two additional principles (best practice and continuous improvement) to help guide policy development and environmental impact assessment. MRC Graphite has considered these principles during planning and feasibility studies for development of the Munglinup Graphite Project. These considerations are summarised in Table 5-1.

Table 5-1 Environmental Protection Act Principles of Environmental Management

Principle	Application
1. The precautionary principle. *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by:* *a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *b) an assessment of the risk-weighted consequences of various options.*	MRC Graphite has undertaken a numerous baseline studies and investigation to understand and assess potential impacts on the local environmental. Throughout the Project design and assessment process, MRC Graphite has and will continue to apply the precautionary principle to avoid, where practicable, serious, or irreversible damage to the environment. For example, MRC Graphite has made every effort to locate infrastructure away or outside of identified conservation significant areas, such as avoiding Kwongkan Shrubland TEC for the placement of waste rock. Where potential significant impacts to the environment have been identified, management strategies have been developed, and will be implemented to avoid or minimise these impacts to a level that is as low as reasonably practicable. MRC Graphite as a subsidiary of Mineral Commodities Ltd will operate under the parent companies' environmental, community and sustainability policies. The Environmental policy outlines their strategies to minimises impacts to the environment and commits directors, managers and employee to the establishment and maintain management system and associated document to manage impact to the environment. (Appendix H) MRC Graphite will update its current management system to ensure it cover all activities associated with the implementation of the Project which have the potential to affect the environment. A key element of the management system includes the assessment of risks as early as practical to enable sufficient planning to avoidance (if practical) and/or mitigation. The environmental risks associated with this Project have been assessed and are understood. MRC Graphite considers that scientific uncertainty has been sufficiently reduced such that the precautionary principle is not triggered.
2. The principle of intergenerational equity. *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*	The development of the Munglinup Graphite Project will help meet a growing global demand for graphite. This is driven by the expected increasing demand for electric vehicles to replace internal combustion vehicles reliant on petroleum. This also presents an opportunity for the

Principle	Application
	Western Australian economy to diversify its mineral exports. Integration of sustainable development principles into all aspects of the Project, from the design phases through to the operational phase, will ensure the overall environment is maintained for future generations. The proposal meets the principle of intergenerational equity by ensuring the health and ecological functions of the environmental values are maintained for future generations. Closure planning and implementation will promote consistency with the principle of intergenerational equity through minimisation of legacies following completion of mining operations.
3. The principle of the conservation of biological diversity and ecological integrity. *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	MRC Graphite has commissioned studies and investigations to assess potential impacts to biological diversity and ecological integrity resulting from the Project. Outcomes of these surveys and studies have been documented in the baseline study, impact assessment memo and in this supporting document. Clearing has been avoided and/or minimised wherever possible and infrastructure sited away from ecological sensitive areas wherever practical. Where potential significant impacts to biological diversity and ecological integrity have been identified, management strategies have been, and will continue to be, implemented to avoid or minimise these impacts to a level that is as low as reasonably practicable. MRC Graphite recognises the values of local biodiversity present within the Project area and have designed the Proposal to avoid conservation significant ecosystems and habitats including the Kwongkan Shrubland TEC and Carnaby's Black Cockatoo foraging habitat.
4. Principles relating to improved valuation, pricing and incentive mechanisms. (*1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.*	MRC Graphite recognises the need to provide sufficient funds to ensure environmental management measures are implemented throughout the project life. Provision has also been made for costs associated with closure and decommissioning and these costs form part of the cost of production. MRC Graphite will ensure the most appropriate environmental standards are used during construction and operations to minimise emissions and discharges where practicable and ensure negative legacies are not created. MRC Graphite has considered the following valuation, pricing and incentive mechanisms as relevant to the Project: • Where possible requirements for consumables will be minimised and materials will be recycled. • Minimising clearing which presents a cost saving associated with earthworks as well as a reduced environmental impact.

Principle	Application
	• Progressive rehabilitation to assist with restoring natural ecosystems, whilst reducing the costs associated with the Mining Rehabilitation Fund. • Closure and decommissioning costs will be further considered and included in the Mine Closure Plan.
5. The principle of waste minimisation. *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	Waste minimisation principles have been considered as part of design and feasibility studies, including: • Recycling groundwater from dewatering for use in processing and dust suppression. • Recycling wastewater from the TSF for re-use in the processing plant. • Waste landforms to be conservatively designed to minimise erosion and the exposure of dispersive materials.
6. Best practice. *When designing proposals and implementing environmental mitigation and management actions, the contemporary best practice measures available at the time of implementation should be applied.*	MRC Graphite will endeavour to prepare best practice measures during the approvals process and ensure they are implemented throughout the LOM.
7. Continuous improvement. *The implementation of environmental practices should aim for continuous improvement in environmental performance.*	The Project environmental management system which will encompass the principle of continuous improvement and incorporate Management Review to ensure MRC Graphite environmental performance is continuously improved.

5.2 Identification and Assessment of Environmental Factors

MRC Graphite has taken into consideration all available information at the time of preparing this document including the site layout, baseline environmental data, and regional environmental and social context. Using this information, the following are identified as being key environmental factors to the Project:

- Flora and Vegetation;
- Terrestrial Fauna;
- Inland Waters; and
- Social Surrounds.

Information relating to these environmental factors, including a description of potential impacts and mitigation measures, are provided in Section 5.2, 5.4, 5.5 and 5.6.

Other environmental factors which have been considered as relevant to the Project (but are not key factors) are also discussed in less detail in Section 6. These include:

- Short Range Endemic Fauna;
- Ecological Linkages; and
- Aquatic Fauna.

Other environmental factors which were not considered relevant to a land-based Project have not been further discussed in this document. These include:

- Landforms;
- Subterranean Fauna;
- Terrestrial Environmental Quality;
- Air Quality;

- Greenhouse Gas Emissions; and
- Human Health.

5.3 Environmental Factor – Flora & Vegetation

5.3.1 EPA Objective

The EPA Objective for Flora and Vegetation is to '*protect flora and vegetation so that biological diversity and ecological integrity are maintained'.*

5.3.2 Policy & Guidance

The following guidance and policy are relevant to this objective:

- Environmental Factor Guideline – Flora and Vegetation (EPA, 2016a).
- Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b).

5.3.3 Receiving Environment

The Project area is located within the South-West Botanical Province. A regional overview of flora and vegetation is provided in Section 4.6.1.

The following flora and vegetation studies have been completed:

- Ecologia Environment, 2015, Munglinup Graphite Project Flora and Fauna Assessment (Ecologia Environment, 2015);
- Woodman Environmental, 2018, Peer Review of Consultant Report Level 2 Flora and Vegetation Assessment in the Munglinup Area (Woodman Environmental, 2018a);
- Woodman Environmental, 2018, Survey for TEC 'Proteaceae Dominated Kwongkan Shrublands of the southeast coastal floristic province of Western Australia' and habitat for the Threatened taxon *Rhizanthella johnstonii* (Woodman Environmental, 2018b)*;*
- Woodman Environmental, 2018, Detailed Flora and Vegetation Assessment – Interim Report (Woodman Environmental, 2018c);
- Woodman Environmental, 2019, Flora and Vegetation Assessment – Spring Survey (Woodman Environmental, 2019b);
- Woodman Environmental, 2019, Desktop Review of Potential Regional Extent of Vegetation Units (Woodman Environmental, 2019a);
- Woodman Environmental, 2020, Detailed Flora and Vegetation Assessment (Woodman Environmental, 2020a); and
- Woodman Environmental, 2020, Flora and Vegetation Impact Assessment Memo (Woodman Environmental, 2020b).
- Glevan Consulting, 2018, Munglinup *Phytophthora* Dieback Occurrence Assessment (Glevan Consulting, 2018).
- Great Southern Bio Logic, 2019, Phytophthora Dieback Occurrence Survey MRC Graphite – Munglinup (GSBL, 2020).

A detailed summary of the flora and vegetation surveys (including the significant species observed) undertaken across the Project area has been included in Sections 4.6.2 to 4.6.6 and copies of the study report are provided in Appendix C-3 and Appendix C-4. A summary of the *Phytophthora* Dieback assessment undertaken is presented in Section 4.6.7 and the Great Southern Bio Logic survey report is provided in Appendix C-6.

During the Project desktop assessment, nine threatened flora taxa have been identified with the potential to occur within the Project area. These being:

- *Anigozanthos bicolor subsp. minor* (Endangered),
- *Conostylis lepidospermoides* (Endangered),
- *Eremophila subteretifolia* (Endangered)*,*

- *Eremophila denticulata subsp. denticulata* (Vulnerable),
- *Eremophila lacteal* (Endangered),
- *Kennedia glabrata* (Vulnerable),
- *Lambertia echinate* subsp. *Echinate* (Endangered),
- *Ricinocarpos trichophorus* (Endangered) and
- *Roycea pycnophylloides* (Endangered).

Only one of these threatened flora species was recorded during the Project survey (*Conostylis lepidospermoides)*.

Two TECs were identified within the Desktop study area from Woodman Environmental's Desktop Review (Woodman Environmental, 2019a). Of these only one TEC, the Proteaceae Dominated Kwongkan Shrubland has been recorded within the extent mapped within the Project area. The TEC was mapped inside (33ha) and outside (374ha) of the development envelope, with the potential of 10ha being removed.

Flora and vegetation surveys within the Project area recorded three Priority Flora Taxa within the Project area - C*ommersonia rotundifolia* (Priority 3), *Stachystemon vinosus* (Priority 4) and *Pultenaea calycina* subsp. *proxena* (Priority 4). Seventeen vegetation units were identified and mapped in the Combined Study Area, of which 13 are at risk of impact in the development envelope. The scale of local impact was ranked Low for 11 VUs, based on the extent of mapping of each VU within the Combined Study Area and development envelope. Of the 13, the significance of local impact was ranked Moderate or Moderate-High for two of these (VUs 7, 15). At the regional scale, there will be Low-Moderate significance of impact to VU 7, and Moderate-High significance of impact to VUs 5 and 15.

It appears unlikely that any of the VUs recorded in the Study Area rely upon the local groundwater table for survival, rather utilising soil stored moisture from rainfall as their primary source of water during drier months. In particular, those VUs that occur higher in the landscape such as VUs 16 and 17 that comprise the Proteaceae Dominated Kwonkgan Shrublands of the Southeast Coastal Floristic Province of Western Australia TEC (Endangered – EPBC Act) are situated where the water table is located well in excess of 10m from the ground surface and therefore are not groundwater dependent (Woodman Environmental, 2020a; Rockwater, 2020a).

Survey Efforts

Table 5-2 summaries the survey effort used to understand the vegetation units present within the Project study area since 2018.

Table 5-2 Summary of Survey Efforts in Study Area

Survey Effort	TEC and UG Orchid Survey 2018	Spring Survey 2018	Detailed Spring Survey 2019	Regional VU Survey 2020
Field days	2 X 3 Day Surveys	10 Days	4 Days and 5 Days	3 Days
Quadrats / Transects	Vegetation Type Target Searching using Foot and Vehicle - Transects	60 X 100m² for understory - Quadrats 60 X 400m² for upper story - Quadrats	60 X 100m² for understory 60 X 400m² for upper story	Vegetation Type Target Searching by Foot - Transects
Survey Timing	May and July	September 2018	September 2019 & November 2019 (As required for 2 target flora)	March 2020

Survey Limitations

Table 5-3 presents the limitations of the Woodman Flora and Vegetation survey of the study area in accordance with EPA (EPA, 2016b).

Table 5-3 Survey Limitations of the Woodman Environmental Studies

Limitation	Limitation of Survey	Comment
Effort and Extent	No	A Detailed Survey was undertaken in September 2018, within the peak flowering season in the Esperance Plains region. Quadrats were established in each vegetation pattern identified in the Study Area. It is considered that the survey being conducted in the peak flowering season only is appropriate, as it is likely that most taxa that flower outside the peak flowering season could be identified during the surveys. Rhizanthella johnstonii (Threatened) (previously identified as potentially occurring in the Study Area), which is only visible from June-July, was specifically searched for during a separate visit (undertaken in July 2018). Targeted survey for significant flora taxa identified from the desktop study within appropriate habitat in the Development Envelope, as well as the wider Study Area, was undertaken at times of year appropriate for target taxa. No constraints prevented appropriate sampling techniques (quadrat establishment, foot transects) being employed.
Competency / experience of the team carrying out the survey	No	Team leaders have had extensive experience (>10 years) in conducting similar assessments in the south-west and have conducted numerous flora and vegetation surveys within the Esperance Plains bioregion. Other field team members also have previous experience in assisting with flora and vegetation surveys in the region. Personnel conducting plant identifications have had >10 years' experience in plant identification in the south-west as well as five years' experience in plant identification in the Esperance Plains bioregion.
Competency /experience of the team carrying out the survey	Partial	All vascular groups that were present in the Study Area were sampled. A high proportion of perennial vascular taxa were recorded based on the intensity and method of survey, and almost all could be positively identified. A high proportion of annual vascular taxa were recorded based on the timing, intensity and method of survey, and above average rainfall prior to survey (see timing/weather/season/cycle below). Some annual taxa, as well as perennial taxa with annual above-ground parts, could not be detected because of the timing of survey; however, the number of such taxa is likely to be small. Unknown vascular taxa were collected, with specimens identified at the WA Herbarium. Adequacy of survey measures indicate a high percentage (83.5) of taxa expected to occur in the Study Area was recorded (Chao-2 estimator), and the number of quadrats established in the Study Area satisfies the criterion suggested by Mueller-Dombois and Ellenberg (1974), with a final increase of 2.43 % in species recorded per increase of 10 % of quadrats.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	No	Reasonable contextual information for the Study Area was available prior to the survey. Sources of information used included government databases (DBCA), which are known to have been extensively populated with data from numerous surveys conducted in the general vicinity of the Study Area, as well as numerous general sources pertaining to the climate, geomorphology, flora and vegetation of the region, and several surveys conducted in the local area, including two that overlapped the Study Area.
Timing/weather/season/cycle	No	The field survey was conducted in early Spring, corresponding with what is considered the optimum flowering period for the Esperance Plains region. The 2018 and 2019 flowering periods were considered by Woodman Environmental to be good, with slightly above-average rainfall received from May - August in 2018 (249.8 mm compared to the longterm average of 230.6 mm), and slightly below-average rainfall received during the same period in 2019 (201.8 mm) (Bureau of Meteorology 2019). However, the months of September and October 2019 were warmer and drier than average, which may have affected the longevity of the flowering season for many species, and affected flowering of late-spring flowering species to some extent. A small number of taxa may not have been identified during the survey because they were not detectable or

Limitation	Limitation of Survey	Comment
		identifiable because of their flowering time, however, no such taxa are likely to be significant taxa. *Rhizanthella johnstonii* (T), which was considered to potentially occur in the Study Area by previous surveys, is only identifiable in winter; however, a separate visit to search for this taxon was undertaken. Several Priority flora taxa known from the Desktop Study Area are only identifiable during particular times in spring, however, separate visits in September and November 2019 were undertaken to target such taxa. Regional targeted survey for significant vegetation was undertaken in early Autumn 2020, when annual taxa were not present; however, it is considered that this did not have a significant impact on the results of the survey.
Disturbances (e.g. fire, flood, accidental human intervention etc.), which affected results of survey	No	Some historical disturbances associated with exploration were apparent; however, these did not appear to have significantly impacted the flora taxa present and are therefore not considered to have affected the results of the survey. A large proportion of the Study Area has been recently burnt; however, this also does not appear to have significantly impacted the results of relevant aspects of the survey, including vegetation mapping and floristic classification.
Remoteness and/or access problems	Partial	Vehicle access to the Study Area was somewhat limited, particularly in the central and eastern part; this affected the intensity of sampling in this area to an extent, as it took a significant amount of time to access this part of the Study Area on foot. Large portions of the recently burnt areas of the Study Area were also exceptionally thick, and foot traverses through such areas were very difficult; this also affected sampling locations and intensity to an extent. However, neither of these issues are considered to have had a significant bearing on the results of the survey. Similar issues were encountered during the regional targeted survey for significant vegetation, which affected the amount of vegetation that could be assessed during the survey.

5.3.4 Potential Impacts

The proposal could result in the direct loss of up to 350ha of native vegetation. In addition to this, the following potential impacts on flora and vegetation have been identified:

- Direct vegetation loss from clearing and ground disturbance activities resulting in the possible loss of biological diversity in the area (Table 5-4).
- Disturbance and/or removal of conservation significant flora species and/or communities from clearing and ground disturbing activities.
- Fragmentation of vegetation within an already fragmented remnant vegetation corridor.
- Degradation of vegetation and vegetation communities within the Project area resulting in edge effects along clearing boundaries.
- Potential spread of weed species or introduction of new weed species into the vicinity from increased vehicle movement and activity.
- Potential introduction of *Phytophthora cinnamomi* (Dieback) to the Project Area resulting in vegetation degradation, vegetation loss and habitat alteration. *Phytophthora* Dieback infestations have been identified along roadsides within 5km of the Project.
- Potential introduction of *Phytophthora cinnamomi* (Dieback) into the TEC resulting in vegetation degradation, vegetation loss and habitat alteration. These impacts would result in the loss of the TEC.
- Loss of *Leucopogon* aff. *canaliculatis,* Synaphea aff. *drummondii* and *Synaphea* sp. Jilakin Flat Rocks Rd (R. Butcher et. al RB200) populations from the introduction of *Phytophthora cinnamomic* (Dieback)
- Dust generation during vehicle and machinery operation causing impacts to vegetation health from the clogging of stomata with dust.

- Vegetation loss or change in health from saline water overspray, spillages of saline water, tailings and/or hydrocarbons from pipelines, contaminated runoff or dust suppression activities.
- Unauthorised clearing or a change in vegetation health associated with Kwongkan Shrubland TEC from off track driving and overspray of saline water during dust suppression.
- Damage to and loss of vegetation through the accidental generation of bushfire.
- Altered hydrology and drainage shadow (potential for significant reduction or removal of seasonal surface water flow, causing either death or loss of condition to individual plants or vegetation).
- Increased risk of bushfire or accidental bushfire

5.3.5 Mitigation

The mitigation hierarchy has been applied to flora and vegetation as outlined below.

Avoid

- Avoid wherever possible minimise clearing of the Kwongkan Shrubland TEC, localling restricted vegetation units, EPBC List Threatened Flora Species.
- Avoid accidental clearing of known locations of conservation significant flora species by:
    - Implementing an internal clearing permit procedure.
    - Undertaking pre-clearing ground truthing to validate locations of conservation significant flora.
- Clearing activities will be managed to ensure clearing is strictly limited to that necessary for operations, through the implementation of an internal Ground Disturbance Procedure and permit system with register. The boundary of clearing will be marked prior to clearing occurring and not clearing will occur without authorisation.
- Disturbance footprint has been revised on the Eastern Access road to avoid all *Synaphea* sp. Jilaken Flat Rocks Rd (R. Butcher et. Al. RB200).

Minimise and Manage

- Potential impacts to flora and vegetation will be minimised through the implementation of the Flora and Vegetation management Plan (Appendix D).
- Disturbance footprint has been revised to minimise impacts to Priority Flora.
- Disturbance footprint has been revised to minimise impact to the *Leucopogan* aff. *canaliculatus* and *Synaphea* aff. *Drummondii.*
- Disturbance will be minimised through careful design of the site layout taking into consideration flora and vegetation values.
- Growth medium will be collected and stockpiled to prevent the loss of seed bank, where possible, topsoil will be directly returned to rehabilitation areas.
- Undertake additional searches for Conservation Significant Species outside the development enveloped within the Munglinup Reserve post approval.
- Additional searches for novel species; *Leucopogan* aff. *canaliculatus* and *Synaphea* aff. *Drummondi* and *Synaphea* sp. Jilaken Flat Rocks Rd (R. Butcher et. Al. RB200) will be undertaken post approval.
- Population of Conservation Significant Species and the TEC adjacent to proposal clearing areas will be clearly marked in the field to prevent accidently clearing.
- Incorporate dust management measures, including dust suppression activities along haul and access roads to limit dust generation.
- The process plant will have dust suppression measures fitted, such as water sprays on conveyors, ROM pad and stockpiles.
- Review existing weed occurrences and signpost areas of significant weed infestations.
- Educate mine personnel on the identifying and managing the key weed species.
- Maintain firebreaks to assist with fire management and control.
- Vehicle and equipment hygiene procedures will be implemented to minimise entry of weeds and soil borne diseases including *Phytophthora* Dieback.

- Vehicles and equipment will be required to use washdown bays in accordance with the Dieback Management Plan during and three days after a rain event.
- Undertake vegetation health monitoring in accordance with the Flora and Vegetation Management Plan (Appendix D) to determine and manage impacts associated with the Project, such as vegetation health along roadsides using visual inspections of dust or remote sensing to assess vegetation health (NDVI assessments).
- MRC will periodically undertake an audit of compliance of its hygiene procedures.
- A registered Dieback interpreter will assess and map potential occurrence adjacent to the cleared areas every three years.
- *Phytophthora* Dieback uninterpretable vegetation will be managed as if it were infested to reduce the potential for accidental introduction or spread to areas within the Project area which are uninfested.
- *Phytophthora* Dieback susceptible vegetation will be monitored for any signs of infection at regular intervals in accordance with the Project Dieback Management plan (this include the Novel Species).
- Potential impacts to flora and vegetation identified will be minimised through implementation of the Flora and Vegetation Management Plan (Appendix D).
- The minimisations of the impact of *Phytophthora* Dieback will be managed through implementing the Dieback Management Plan (Appendix E).

Rehabilitate

- Undertake progressive rehabilitation where possible.
- If possible incorporate Priority flora and Novel species seeds into seed mix.
- Local provenance seed collection will be undertaken to be used for rehabilitation activities.
- Utilise the return of vegetation and topsoil or growth medium stockpiles to facilitate plant establishment and growth.

5.3.6 Assessment of Impacts

Clearing/ Loss/ Degradation

The Project will require the clearing of up to 350ha of native vegetation within a 650ha development envelope (Disturbance Footprint). At the regional extent this will only have a Moderate to High potential for significant impact on three of 17 VUs. At a local level it is considered a Moderate to High potential for significant impact on four VUs. At a direct local level, working within the Development Envelope, nine VUs have the potential to be significantly impacted to a Moderate or High level, working within the Disturbance Footprint only two vegetation units may be significantly impacted with near or greater clearing of 50% (Table 5-4). VU7 will likely have a direct impact of 63.01% and VU15 having a direct impact of 48.54% within the Disturbance Footprint. However, the Project is located within a vegetation corridor across a fragmented regional landscape.

Consequently, ground disturbance activities will result in the following impacts to conservation significant flora and vegetation:

- 33ha of the Kwongkan Shrublands TEC is within the development envelope; however, its clearing will be limited to 10ha inside of the conceptual site layout.
- 1 individual of C*ommersonia rotundifolia* (Priority 3) are within the development envelope in one location. With only nil individual being inside the disturbance footprint.
- Up to 1321 individuals of *Pultenaea calycina* subsp. *proxena* (Priority 4) are within the development envelope from 183 locations, with 577 being inside the disturbance footprint.
- Up to 148 individuals of *Stachystemon vinosus* (Priority 4) are within the development envelope from 49 locations, with 74 individuals being inside the disturbance footprint.
- Up to 1884 individuals of *Leucopogan* aff. *Canaliculatus* are within the development envelope with 175 individuals being inside the revised disturbance footprint and will be removed by the Project.
- Up to 112 individuals of *Synaphea* aff. *drummondii* are within the development envelope, with 13 individuals being inside the revised disturbance footprint and will be removed.

- Up to 90 individuals of *Synaphea* aff. Jilakin Flat Rocks Rd are within the development envelope, with 0 individuals being inside the revised disturbance footprint and will be removed.
- All vegetation system associations of the Study Area are present within the Development Envelope.

Table 5-4 Disturbance by Vegetation Type within the Development Envelope

Vegetation Unit	Local Area Characteristics	Preferred Habitat for Significant Flora	Area (ha) of Study Area	Development Envelope (ha/%)	Disturbance Footprint (ha/%)
1	Red-brown, orange-brown or grey-brown clay loam, usually with ironstone, sandstone or mixed colluvial gravel, on upper to mid slopes of valleys and low hills. Relatively extensive in the Study Area and occurs on landforms which are not restricted.	*Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1) *Leucopogon aff. canaliculatus, Stachystemon vinosus* (P4)	514.33ha	149.28/29.09%	42.34/8.24%
2	Red-brown to brown clay loam, usually with ironstone, sandstone or mixed colluvial gravel, on slopes valleys and low hills. Relatively extensive in the Study Area and occurs on landforms which are not restricted.	*Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1)	185.19ha	112.11/60.25%	71.21/38.44%
3	Dark brown to brown clay loam with dolerite gravel and dolerite outcropping on upper and mid slopes of valleys. Relatively rare in the Study Area.	Nil	1.9ha	0/0%	0/0%
4	Skeletal brown sandy loam with sandstone stones over sandstone outcropping on breakaways and ridges.	Nil	7.2ha	0/0%	0/0%
5	Red-brown or light brown sandy loam with sandstone gravel and sandstone outcropping on breakaways and ridges. Not extensive the Study Area and occurs on a landform which is relatively restricted.	Nil	7.5ha	3.59/47.67%	1.07/22.54%
6	Brown sandy loam with sandstone gravel and stones and occasional sandstone outcropping on breakaways and ridges.	Nil	4.6ha	0/0%	0/0%
7	Orange-brown clay or sandy loam on river flats. Although landform is restricted, is it not uncommon.	Nil	27.74ha	19.36/69.79%	17.48/63.01%
8	Brown clay loam with quartz gravel on valley slopes. Although landform is restricted is it not uncommon.	Nil	133.24ha	30.32/22.75%	0.29/0.21%
9	Brown clay loam with quartz gravel on valley slopes. Although landform is restricted is it not uncommon.	Nil	35.7ha	31.31/31.3%	10.04/28.11%
10	Red-brown or brown clay loam with dolerite and occasionally quartz stones on valley flats and slopes. Landform is not considered relatively restricted.	Nil	48.67ha	6.36/13.07%	2.64/5.42%

Vegetation Unit	Local Area Characteristics	Preferred Habitat for Significant Flora	Area (ha) of Study Area	Development Envelope (ha/%)	Disturbance Footprint (ha/%)
11	Brown clayey sand or clay loam with granite and quartz stones and often granite outcropping on low rises and slopes. Relatively restricted landform.	Nil	26.4ha	14.09/53.4%	5.65/21.40%
12	Grey-brown to clay or clay loam in narrow drainage line channels. Although landform is restricted it is not uncommon.	Nil	58.75ha	3.22/5.48%	0.22/0.37%
13	Yellow-brown to light brown sand or sandy clay in broad drainage lines and adjacent flats.	Nil	41.63ha	0/0%	0/0%
14	Grey, light brown or brown clay, clay loam or sandy clay with colluvial stones (frequently sandstone, quartz, ironstone and laterite) on valley slopes and flats and undulating plains. Not a restricted landform type.	*Commersonia rotundifolia* (P3)	495.3ha	205.56/41.5%	139.64/28.18%
15	Grey or grey-brown clay loam with calcareous stones on low rises on undulating plains. Restricted soil and landform type.	*Pultenaea calycina subsp. proxena* (P4)	40.2ha	36.29/90.25%	19.52/48.53%
16	Grey-yellow, yellow-brown or grey-brown sandy or clay loam with lateritic gravel on undulating plains. Relatively extensive in the Study Area and occurs on landforms which are not restricted.	*Conostylis lepidospermoides* (T). *Leucopogon aff. canaliculatus,* *Leucopogon* sp. Cascades (M. Hislop 3693) (P1), *Stachystemon vinosus* (P4), *Synaphea aff. drummondii,* *Synaphea* sp. Jilakin Flat Rocks Rd (R. Butcher et. Al RB200).	284.63ha	28.69/10.08%	5.90/2.07%
17	Grey-brown sand, occasionally with laterite gravel, on undulating plains. Not uncommon in the Study Area and occurs on landforms which are not restricted.	Nil	89.3 ha	4.29/4.78%	0.74/0.82%

The percentage of the pre-european extent of these vegetation system associations (VSAs) within the Recherche IBRA subregion with the implementation of the Project are presented in Table 5-5. The implementation of the Project will not result in these VSAs going below 30% of their pre-european extent threshold (EPA, 2008) (excluding Esperance_47 which is already at below 30%) (Woodman Environmental, 2020b).

Table 5-5 Vegetation System Associations of the Development Envelope and Predicted Change to Occurrence (Woodman Environmental, 2019b)

Vegetation System Association	Pre-European Extent (ha)	Current Extent (ha)*	Current Percentage Remaining	Development Envelope (ha)	Disturbance Footprint (ha)	Percentage Remaining
Esperance_47	408,122.8	60,660.6	14.86%	174.7	37.1	14.9%
Esperance_516	84,604.6	26,861.1	31.75%	474.2	282.9	31.4%
Esperance_931	6,037.3	2,426.3	40.19%	0.3	-	40.18%

Fragmentation / Edge Effects

Whilst the proposed disturbance footprint is relatively small (350ha), there is still the potential to cause edge effects within the vegetation and reduce the size and integrity of the vegetation corridor for fauna and flora dispersal.

Clearing and ground disturbance activities can cause localised fragmentation of vegetation communities leaving 'patches' of intact vegetation. Patches of vegetation are more susceptible to edge effects and other threatening processes, such as fire and weeds, than continuous vegetation (Delnevo, et al., 2019; Ramalho, et al., 2018). Characteristics of vegetation 'patches' such as the size, shape, configuration and connectivity can all influence the persistence of flora species and general vegetation condition (Wilkins, et al., 2006). The Project will require the clearing of up to 350ha of native vegetation within a 650ha development envelope. The site layout and disturbance footprint has been designed to minimise the generation of vegetation patches by placing major features adjacent to one another and without isolating small patches where possible to do so. Site access roads have also been designed to utilise existing access tracks where available to do so to reduce clearing of the Kwongkan Shrubland TEC and indirect edge effects to this community. However, even with these design considerations ground disturbance activities will result in indirect impacts to vegetation this may include edge effects such as the degradation of vegetation along the disturbance boundary.

The extent of indirect impacts relating to edge effects is dependent on the size and shape of vegetation patches as well as the original condition of the vegetation. The vegetation condition within the development envelope ranges from pristine to very good. As such, the vegetation communities are considered to be resilient with the ability to withstand indirect impacts associated to edge effects.

Indirect vegetation loss or death due to fragmentation, saline spills, tailing and / or hydrocarbon spills, contaminated runoff, dust is expected to be minimal. Across the whole project it is predicted that these activities and the edge effect could result in 5% more vegetation removed, this is approximately 17.5ha across the Project. The TEC is located away and upstream from all mining activities. Any accidents involving hydrocarbons from vehicle breakdowns on the main entry road that runs through the TEC will be unlikely to cause an impact to the TEC, with immediate implementation of emergency spill procedures.

Conservation Significant Species and Community

The Kwongkan Shrublands TEC is represented by VUs 16 and 17 in the Study Area (within the northern portion of M74/245). The site layout has been designed to avoid the TEC and the development envelope also avoids the extent of known and mapped TEC. However, a small portion of the Kwongkan Shrublands TEC will need to be cleared to allow for the Eastern Access Road within L74/55 and to upgrade Reynolds Road for the western access.

As per Woodman Environmental (2020), patch sizes and condition thresholds were considered when defining the occurrence of the TEC in the Study Area, including considering vegetation outside the Study Area and also other factors. All areas of VU 16 and VU 17 in both the Study Area and Combined Study Area met the condition thresholds as outlined by DoEE (2014).

In assessing the impacts against the DoEE significance criteria, Woodman Environmental (2020a) have determined that the TEC will be significantly impacted by the Project under the following criteria:

- **Reduce the extent of an ecological community** - There will be direct impact to the Kwongkan Shrubland TEC within the development envelope (33ha). The design of the development envelope has been modified to reduce the extent of impact to this TEC.
- **Fragment or increase fragmentation of an ecological community** - Clearing for the Project within the Kwongkan Shrubland TEC will predominantly involve road construction. The majority of clearing in the north-west service corridor will occur on the boundary with cleared paddock, and therefore not exacerbate fragmentation in this area. There will be minor fragmentation of mapped polygons of this TEC in the north-eastern service corridor, and in the north-western corridor.

Of the twelve recorded Conservation Significant Taxa within the study area, it is only expected that five species will be impacted within the Disturbance Footprint and one additional, being *Commersonia rotundifolia* may possibly be disturbed within the Development Envelope (Woodman Environmental, 2019b). Impacts to conservation significant flora species are considered minimal. Where possible all known recorded locations of Priority flora have been avoided in the proposed site layout; however, some do occur within the development envelope.

Conostylis lepidospermoides (T) is located upstream and outside of both the Disturbance Footprint and the Development Envelope. The only potential indirect impact to this species would be from dust and only in certain atmospheric conditions. These episodes of potential dust fall are unlikely to cause a negative impact.

There will be no direct impact to *Conostylis lepidospermoides (T), Lepidosperma sp. Mt Chester* (S. Kern et al. LCH 16596 (P1) or *Leucopogon sp. Cascades* (M. Hislop 3693 (P1). No known individuals are located within the Development Envelope, and although there is habitat for each taxon in the Development Envelope survey of this habitat did not locate any individuals. Likewise, there will be no significant regional impact to these taxa.

Pultenaea calycina subsp. *proxena* (Priority 4) has been recorded within the Whites and McCarthy West Deposits and will likely be removed to allow for mining of these deposits. *Stachystemon vinosus* (Priority 4) has been recorded along both the western access track and eastern access track corridors. Specimens of this species will likely be removed to allow for road development. There have been no listed threatened taxa identified in the development envelope.

Table 5-6 quantifies the individual number of each conservation significant species that are unlikely to be indirectly impacted within the Study area, those that possibly may be indirectly impacted within the development envelope and those that are almost certainly to be impacted within the Disturbance Footprint.

Table 5-6 Individual Occurrences of Conservation Significant Flora within the Study area, Development Envelope and Disturbance Footprint

Taxon	Status	Study Area No.	Development Envelope No.	Disturbance Footprint - - Original No.	Disturbance Footprint – First Revision No.	Disturbance Footprint – Second Revision No.
Conostylis lepidospermoides	T (VU)	67	0	0	0	0
Lepidosperma sp. Mt Chester (S. Kern et al. LCH 16596)	P1	35	0	0	0	0
Lepidosperma ?sp. Mt Short (S. Kern et al. LCH 17510)	P1	Not counted	0	0	0	0
Leucopogon sp. Cascades (M. Hislop (3693)	P1	35	0	0	0	0
Commersonia rotundifolia	P3	5	0	0	0	0
Dampiera sp. Ravensthorpe (G.F. Craig 8277)	P3	200	0	0	0	0
Pultenaea calycina subsp. *proxena*	P4	1372	1321	577	577	577
Stachystemon vinosus	P4	292	142	77	73	74
Acacia spongolitica	Unusual variant, range outlier	Not counted	0	0	0	0
Leucopogon aff. *canaliculatus*	Potential new taxon	2,009	1884	832	349	175
Synaphea aff. *drummondii*	Potential new taxon	147	112	86	86	13
Synaphea sp. Jilakin Flat Rocks Rd (R. Butcher et. al RB200	Potential new taxon	92	90	86	86	0

As shown in Table 5-6, the disturbance footprint has undergone two design reviews to mitigate the direct impact on the three novel species *Leucopogon* aff. *canaliculatis, Synaphea* aff. *drummondii* and *Synaphea* sp. Jilakin Flat Rocks Rd (R. Butcher et. al RB200). Through this revision there will now be no direct impact to the *Synaphea* sp. Jilakin Flat Rocks Rd (R. Butcher et. al RB200) species, (Figure 5-1) a reduction from 349 to 174 individual *Leucopogon* aff. *canaliculatus* (Figure 5-2) and a reduction from 86 to 12 individual *Synaphea* aff. *drummondii* species directly impacted by the Project (Figure 5-3).

The indirect impact to *Leucopogon* aff. *canaliculatis* will be limited to 5% of the population within the disturbance footprint. That being no more thannine individuals indirectly impacted. The indirect impact to *Synaphea* aff. *drummondii* will be limited to no more than nine individuals impacted. This is at a rate of 10% increase as all of this species are located along access roads, giving a greater chance of indirect impact form dust. A small indirect impact to the *Synaphea* sp. Jilakin Flat Rocks Rd (R. Butcher et. al RB200) species is assumed, like that of *Synaphea* aff. *drummondii* impact will be limited to no more than nine individuals impacted as all of the population within the disturbance footprint is beside an access road corridor.

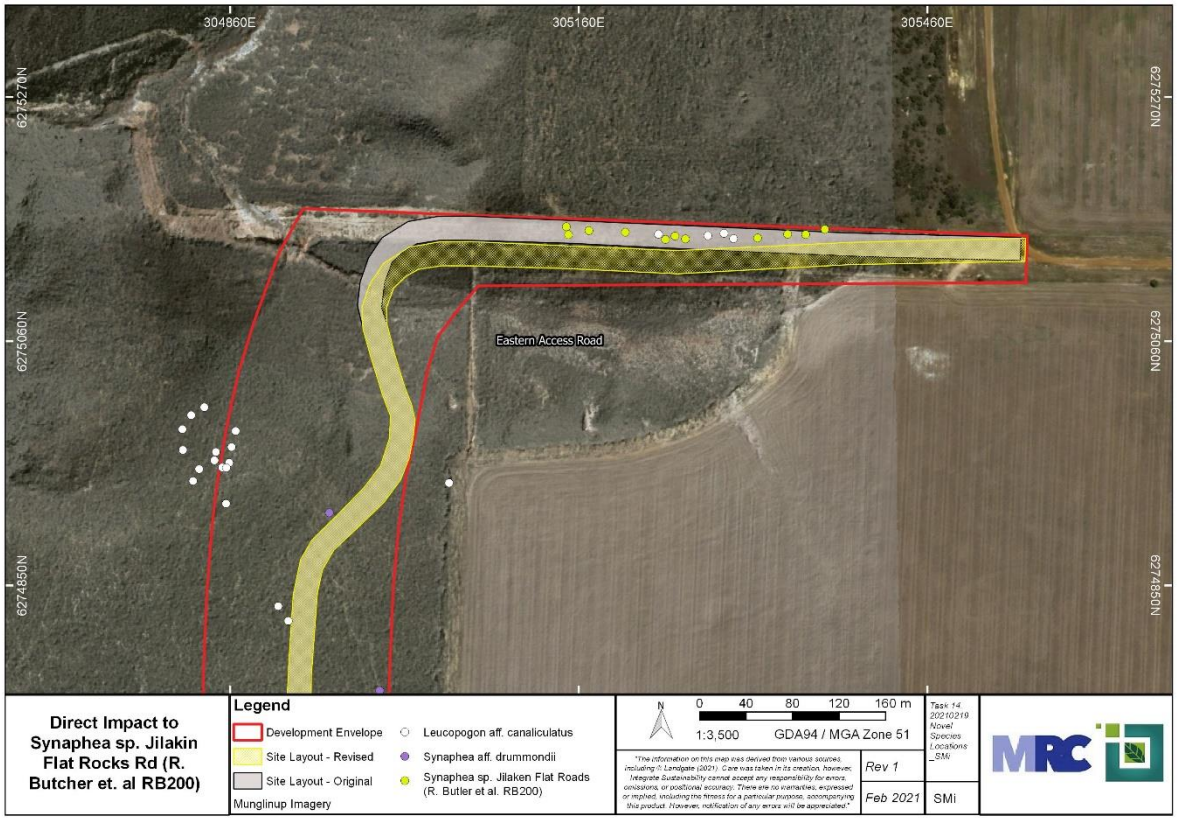


Figure 5-1 Disturbance Footprint Revision to Mitigate the Direct Impact to Synaphea sp. Jilakin Flat Rocks Rd (R. Butcher et. al RB200)

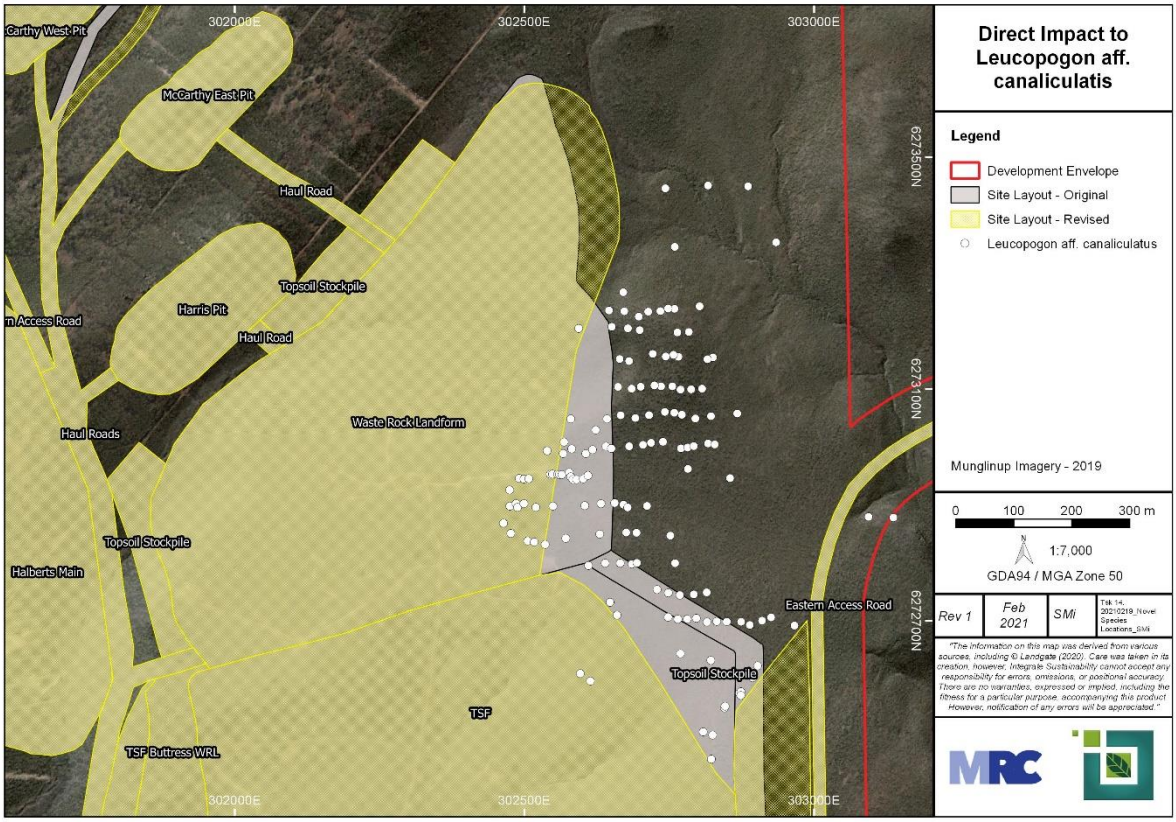


Figure 5-2 Disturbance Footprint Revision to Mitigate the Direct Impact to Leucopogon aff. canaliculatis

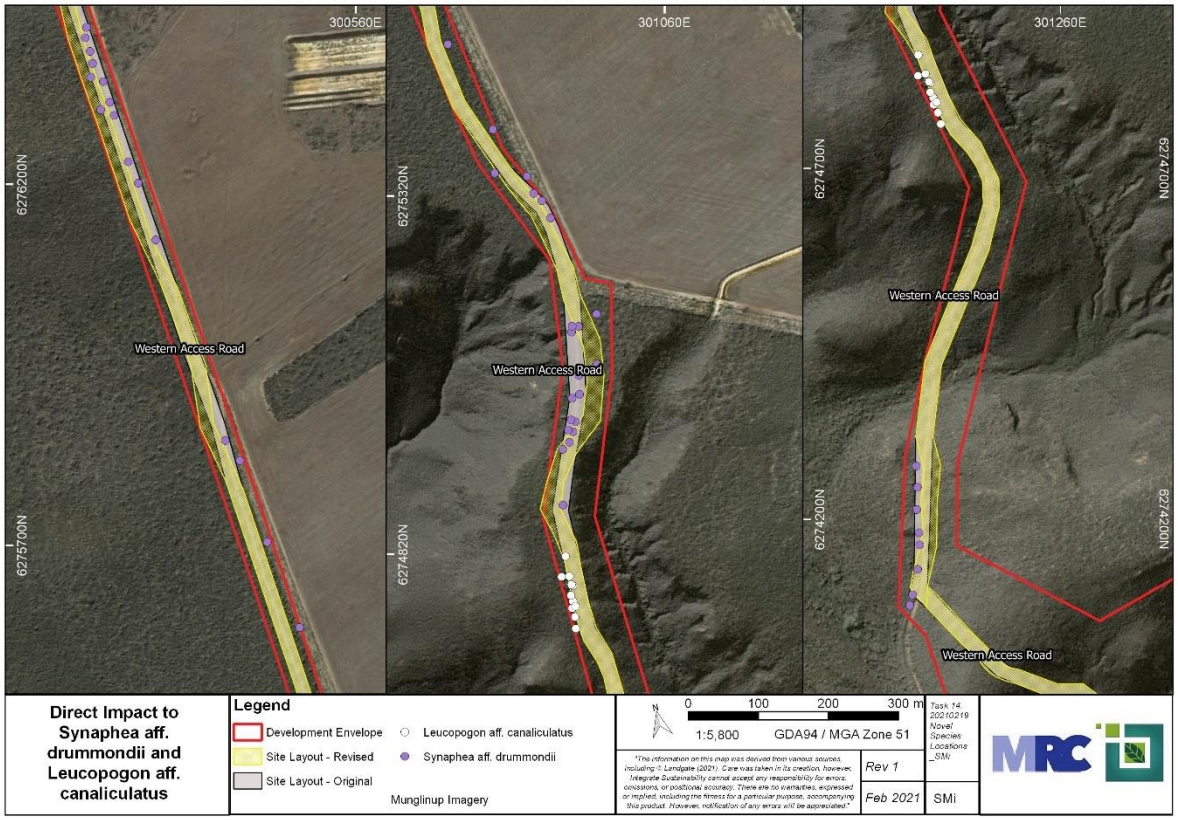


Figure 5-3 Disturbance Footprint Revision to Mitigate the Direct Impact to Synaphea aff. drummondii and Leucopogon aff. canaliculatis

Weeds and Soil Pathogens

A total of 18 environmental weeds were recorded by Woodman Environmental (Woodman Environmental, 2019b) within the Project area, none of which were identified as Weeds of National Significance (WONS) or Declared Pests (weeds). Annual and opportunistic vegetation health monitoring will be undertaken, and compliance of hygiene procedures will be periodically audited to ensure the management of the introduction of new weeds into the project area and specifically the TEC.

The *Phytophthora* Dieback assessment of the Project did not record dieback infestations within the development envelope; however, the majority of the vegetation was identified as uninterpretable. Good practice for *Phytophthora* Dieback is to manage uninterpretable vegetation as if it were infested to reduce the potential for accidental introduction or spread.

There is limited information on the susceptibility of the significant taxa recorded in the Study Area to Phytophthora Dieback (Woodman Environmental, 2020b). However, many species within the genera *Conostylis*, *Leucopogon* and *Synaphea* are known to be affected by Dieback (Dieback Working Group 2008) and therefore it is likely that Dieback could impact the three novel species: *Leucopogon* aff. *canaliculatus*, *Synaphea* aff. *drummondii* and *Synaphea* sp. Jilakin Flat Rocks Rd (R. Butcher et. al RB200).

Impacts to the two *Synaphea* species are not expected as no inflections have been recorded onsite and the Project will implement a Dieback Management plan to prevent the introduction and will monitor to ensure its effectiveness. The *Leucopogon* aff. *canaliculatus* populations are located within the uninterpretable zone of the Project area. Targeted inspections will be conducted on these populations during annual dieback monitoring as outline in the Dieback Management Plan. Impacts associated with Dieback and the management of these impacts are addressed through the implementation of the Dieback Management Plan.

The TEC is considered highly interpretable for the occurrence of dieback. Susceptible flora species occurring within the TEC considered to be indicator species include: *Banksia armata; B. media; B. speciosa; Isopogon Formosa; I. polycephalus; I. trilobus; Lambertia inermis; and Xanthorrhoea platyphylla.* There is a risk of introduction of Phytophthora dieback to the proposal area. Any potential introduction of Phytophthora dieback into the vegetation of the project area could result in the local extinction of susceptible flora and alteration to the structure of ecological communities as a whole. The Kwongkan Shrubland TEC as a whole is susceptible to Phytophthora dieback. Impacts to the TEC from dieback are not expected to occur as the TEC sits upstream to known infestations and with the implementation of the Dieback Management Plan.

As mining activities will be confined to sealed roads and the development envelope, there are no foreseen impacts, either direct or indirect, on the significant flora outside of the Development Envelope caused by the spread of dieback.

Dust

Dust which settles and accumulates on the surface of leaves can significantly alter plant health by reducing transpiration and photosynthesis. Mining activities including vehicle movement, clearing and ore processing are likely to generate dust. Dust can also travel distances through wind gusts.

Some research has been undertaken at mine sites in nearby regions in relation to impact of dust emissions on significant flora taxa. There is some evidence to suggest that dust from mining operations can impact flora taxa or vegetation, but the long-term impact is not clear. Turner (2013) did find that heavy dust loading created reduced stomatal conductance on two *Acacia* taxa; likewise, it was evident in field observations that heavy dust loads did cause some death or stress to plants, including leaf shed. It was found that the leaf surface and dust interaction was more important to stress levels than the actual amount of dust; however, metal-rich dust with low pH may have been the causal factor. The dust levels on ephemeral significant taxa (*Eragrostis crateriformis* (P3) and *Rothia indica subsp. australis (*P1)) as monitored by Woodman Environmental (2017) at Pardoo did not cause significant stress or death to the taxa monitored (Woodman Environmental, 2020b).

Bushfire

There is potential for fires to be triggered by mining activities. The surrounding vegetation within the Project area has a varied fire history from unknown ignition sources (most likely lightning strikes). The highest risk of bushfire ignition occurs during clearing activities. Effective management of clearing activities will prevent the incidence of bushfire. The maintenance of firebreaks will also help to control bushfire.

Altered Hydrology

Rockwater has estimated that the Project area equates to 3.6% of the total Munglinup River Regional Catchment and 1.4% of the Munglinup Catchment at the Oldfield Junction areas. Based on the Project footprint the Munglinup River catchment area associated with the Project Area will reduce from 4.8km2 to 4.5km2 which is estimated to be a reduction of 0.7m^3/s peak flow during a 1-in-5-year event and 0.3m^3/s peak flow during a 1-in-100-year event. These changes in surface flows are not predicted to impact the vegetation located adjacent to the Project within the Munglinup River corridor. MRC Graphite is also establishing internal drainage features to allow surface water to flow around Project infrastructure and remain within the Project catchments limiting impacts.

There is the potential of impact to the vegetation downslope of the areas of impact towards the Munglinup River in each of these sub-catchments due to loss of surface water and subsequent creation of drainage shadows. The vegetation at risk of impact includes both terrestrial vegetation that is reliant on sub-surface soil-water flow, and riparian vegetation that is at least partially reliant on water sources provided by the creeklines and drainage areas. The loss of area of each sub-catchment due to project activities is presented in Table 20 (as calculated and presented by Rockwater 2020; total 31% of the M3 catchment area proposed to be impacted). Three of the four minor creelines who's sub-catchments will be impacted (Creeks A, C and D) will be impacted by project components such as pits and waste rock dumps (Woodman Environmental, 2020b).

Groundwater Dependent Vegetation/ Species

No phreatophytic flora taxa or GDV have been identified as occurring naturally within the Study Area (Woodman Environmental, 2020a). Although groundwater sources are present within 10m of the topographical surface, the water is too saline for use by vegetation. Assessment of impacts to groundwater dependent flora or vegetation is not discussed further.

5.3.7 Predicted Outcome

The proposed Project disturbance footprint and development envelope have been designed with the consideration of flora and vegetation values. This has included the avoidance of conservation significant flora and ecological communities. The clearing associated with the Project will be relatively small; it is acknowledged that the proposed activities could fragmentation of vegetation within the Munglinup Reserve which is within an already fragmented landscape.

Indirect vegetation loss or death due to fragmentation, saline spills, tailing and / or hydrocarbon spills, contaminated runoff, dust is estimated to be up to 5% additional impacted from indirect activities, this is approximately 17.5ha across the Project.

At a site-specific level, it is anticipated that flora and vegetation values can be maintained and impacts to conservation significant flora will be minimal. The Kwongkan TEC has mapped occurrence within the Disturbance Footprint (10ha; VUs 16 and 17) and therefore is at risk of impact. This extent is equivalent to 2.76% of the mapped extent of occurrence in the Combined Study Area and represents 0.00084% of the presumed regional extent of this TEC. This potential impact is consistent with the significant impact criterion '*Reduce the Extent of an Ecological Community*', as per the significant assessment guidelines presented by DoEE (2013). Based on the assessment, it is predicted the Proposal can partially meet the EPA objective for this factor - '*to protect biological diversity and maintain ecological integrity'*.

5.4 Environmental Factor – Terrestrial Fauna

5.4.1 EPA Objective

The EPA objective for Terrestrial Fauna is to '*protect terrestrial fauna so that biological diversity and ecological integrity are maintained'.*

5.4.2 Policy & Guidance

The following guidance and policy are relevant to this objective:

- Environmental Factor Guideline: Terrestrial Fauna (EPA, 2016c).
- Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna (EPA, 2016d).
- Technical Guidance – Terrestrial Fauna Surveys (EPA, 2016e).

5.4.3 Receiving Environment

The following fauna studies have been completed:

- Ecologia Environment, 2015, Munglinup Graphite Project Flora and Fauna Assessment (Ecologia Environment, 2015);
- Biostat, 2018, Peer Review on Munglinup Graphite Project Flora and Fauna Assessment (Biostat, 2018);
- Red Dog Environmental, 2018, Supplementary Fauna Survey (Red Dog Environmental, 2018a);
- Red Dog Environmental, 2018, Extended Fauna Assessment E74/565. Munglinup Graphite Project (Red Dog Environmental, 2018b);
- Western Ecological, 2020 Level 2 Fauna Survey – Munglinup Graphite Project (Western Ecological, 2020a); and
- Western Ecological, 2020 Vertebrate Impact Assessment Memorandum – MRC Munglinup Graphite Project (Western Ecological, 2020b);

In 2019, Western Ecological reclassified the fauna habitat types into 6 broadscale fauna habitat types for assessment and mapping during their field assessment (Western Ecological, 2020a). There are two predominant habitat types which occur within the development envelope that will be impacted by development activities, these being the Mallee Shrubland and Tall Mallee Shrubland.

Four conservation significant fauna species have been recorded or observed within the development envelope over the entirety of surveys conducted - Quenda, Malleefowl, Western Brush Wallaby and Carnaby's Black Cockatoo. An additional two conservation significant fauna species have been identified as Likely to occur in the development envelope - Peregrine Falcon and the Fork-Tailed Swift. Two species have been identified as Possible to occur in the development envelope - Chuditch and the Western Mouse. A further three fauna species of conservation significance have been identified as being Unlikely to occur within the development envelope - Baudin's Cockatoo, Red-Tailed Phascogale and the Tammar Wallaby (Western Ecological, 2020a).

Additional information on fauna studies completed, fauna habitats and conservation significant fauna species is provided in Section 4.7.

Survey Efforts

The surveys undertaken prior to 2019 were a mixture of reconnaissance and targeted threatened species surveys that fell within the 2019 Western Ecological field survey. The pre-2019 surveys comprised a combination systematic searches, opportunistic observations, camera trap and acoustic sampling / recordings. The Level 2 Detailed Terrestrial Fauna survey conducted by Western Ecological in 2019 built onto the previous survey work and effort undertaken in the study area. Over the last five years, 25 field days and 1000 camera nights have been used to understand the terrestrial fauna species and habitat values within the Project Area. Additional time has been allocated to understand threatened species occurrence in the region. The total survey effort by trip is summarised in Table 5-7. It should also be noted that no threatened species were observed while undertaking other biological baseline surveys.

Table 5-7 Summary of Survey Efforts in Study Area

Survey Effort	Ecologica 2015	Red Dog Environmental 2018a	Red Dog Environmental 2018b	Western Ecological 2019a
Duration of Survey	4 days	5 days	6 days	15 days 10 days site survey 5 days regional survey

Survey Effort	Ecologica 2015	Red Dog Environmental 2018a	Red Dog Environmental 2018b	Western Ecological 2019a
Physical Trapping	-	-	-	12 Site (10 nights) – 5 pitfalls, drift fence, 8 funnel traps, 5 Elliott traps and 4 cage traps
Camera Traps	4 cameras (12 camera nights)	Not used	30 Cameras – 5 sites with 5 cameras (25, 5 days) and 5 more	10 cameras (55 nights during the trapping event) 10 Cameras (864 camera nights between Sep-Dec 2019)
Micro bat assessments	Not undertaken	One SM2 at 2 sites for 2 nights	Two SM2 at four sites for two nights each	Two SM2 at six sites for two nights each
Searches	25 search sites (12.5 hours of search effort)	Effort not documented	Five transects were walked	12 sites (10 nights), 20 min bird sampling at each site, nocturnal spotlighting (3 hours), 15 photo points

The 2019 Level 2 survey was undertaken in Spring over 10 trap nights rather than the typical 7 nights. This approach was discussed with Mike Young from the DWER Terrestrial Ecosystems branch prior to the survey being undertaken. This approach was thought to increase the sampling period improving the survey effort associated with a single season. Trap nights were increased from 7 to 10, which is approximately 40% more than what is typically undertaken in WA for EIA type assessments. This survey was also undertaken during the primary season when most species would be active.

It is acknowledged that some of the species are likely to have low numbers or challenging to observe with standard survey method, however it is believed that the survey effort over the five-year period is suitable to understand the key species occurring in the Project area.

Survey Limitations

Table 5-8 presents the limitations of the Western Ecological survey of the study area in accordance with EPA (EPA, 2016d).

Table 5-8 Survey Limitations of the Western Ecological Surveys

Limitation	Impact on the Assessment
Qualifications and survey experience	The Zoologists that undertook the survey are qualified and experienced. Dr Ron Firth has over 20 years of experience designing, managing and undertaking biodiversity and ecological surveys throughout Western Australia, the Northern Territory, Queensland, New South Wales and Victoria. He has written over 100 consultant reports and has authored or co-authored 15 papers that have been published in peer reviewed scientific journals and has made other contributions to Books. Laura Stevens has over 6 years of experience undertaking fauna surveys in Western Australia and has written more than 20 consultant reports. Therefore, no perceived limitations associated with qualifications and experience.
Timing - weather, season	The regional threatened species habitat assessments were undertaken from the 13-16 September 2019. These assessments were primarily about assessing habitat for the Malleefowl, Carnaby's Cockatoo (and Baudin's Cockatoo), Chuditch and Red-tailed Phascogale which are all active year round despite temperature because they are birds and mammals (homeotherms). The level 2 fauna assessment was undertaken from 6-20 November (late spring in the south west). This is the recommend time to survey for species that are much more temperature dependent i.e. reptiles according to guidance (October to December – primary season to survey). The nearest BoM weather station to the study area with long-term temperature and rainfall records is Munglinup West (station number 012044), approximately 22 km north-west of Munglinup. Mean maximum temperature for

Limitation	Impact on the Assessment
	the month of November is 26°C, while mean minimum temperatures for November is 11.3°C (BoM 2020). The average rainfall for November at the Munglinup West weather station is 29.5 mm, however, only 14.2 mm was recorded in November 2019. The annual long-term average (2002 – 2019) rainfall at the Munglinup West weather station is 450.8 mm (BoM 2020). Rainfall for 2019 is well below the average with only 252.8 mm being recorded. It is difficult to determine what the impacts of the low rainfall are on the fauna in the study area and their detectability. However, there is likely to be an impact on food resources either directly or indirectly and this is likely to impact on their abundance and consequently their detectability but this is not quantifiable from the work undertaken so far. Also frog activity may have also been impacted by the low rainfall (only one species was recorded during the survey).
Scope - Life forms sampled	The primary objective of the survey was to sample terrestrial vertebrates by undertaking a level 2 fauna assessment (baseline trapping) and an assessment of habitat and targeted searches for the Malleefowl, Carnaby's Cockatoo (and Baudin's Cockatoo), Chuditch and Red-tailed Phascogale and this was achieved.
Sources of information	Several previous surveys have been undertaken in the current study area (see section 1.5 above) and the reports from this work were available for this report. Several database searches were undertaken and included the DBCA threatened fauna database (DBCA 2019), NatureMap (DBCA 2019) and the EPBC PMST (DEE 2019). Field guides and other scientific literature were also used where relevant. Sources of information are therefore considered more than adequate.
Completeness	The main objective of the survey was to undertake a level 2 fauna assessment (baseline trapping), an assessment of habitat and targeted searches for the Malleefowl, Carnaby's Cockatoo, Chuditch and Red-tailed Phascogale and this was achieved. Then based on previous surveys, the current survey and database search results we assessed the likelihood of the Malleefowl, Carnaby's Cockatoo, Chuditch and Red-tailed Phascogale occurring in the study area. This was achieved. Important to also note that trapping was undertaken over 10 nights instead of the seven nights as outlined in guidance.
Disturbance	The study area has been disturbed as a result of historic and current mining. Recent exploration activity has also resulted in disturbance associated with the clearing of some vegetation, primarily for drill lines and drill pads but also for some tracks. Foxes (*Vulpes vulpes*), Cats (*Felis catus*) and Rabbit (*Oryctolagus cuniculus*) scats and scratching's were also recorded in the study area. The extent to which these disturbances might have impacted on the results is difficult to quantify based on the work undertaken in the study area thus far, as this work represents baseline information (predation from Foxes and Cats is an obvious impact).

5.4.4 Potential Impacts

The following have been identified as having the potential to impact on terrestrial fauna, including fauna habitats and conservation significant fauna species:

- Loss of habitat and connectivity between habitat patches or other vegetation (Table 5-9).
- Indirect impacts to Terrestrial fauna species classified as MNES from changes in vegetation health due to dust, saline water release and unauthorised activities.
- Loss of conservation significant species foraging habitat.
- Fauna injury or death resulting from clearing, machinery, and vehicle movement. Species such as Malleefowl that tend to be more activity as dawn and dusk may be at greater risk and dealth to individual may have greater impact to the local population.
- Entrapment and death of fauna within trenches, drill holes, excavations, containers, and water storage structures. Loss of an individual Malleefowl from this type of indirect impact may by greater than for other fauna species due to a smaller local population.
- Fragmentation resulting in reduced dispersal of fauna species and individuals across the landscape.
- Increased human activity in the area attracting feral fauna and resulting in competition or predation from introduced species.
- Disruption or disturbance to fauna and fauna populations resulting from noise, dust, vibration and light emissions from the mining operations.

- Increased risk of bushfire or accidental bushfire altering fauna habitats and fauna populations.

5.4.5 Mitigation

The Project is restricted to the Graphite deposits and the proposed clearing of up to 350ha of fauna habitat will be minimised as much as practicable. The mitigation hierarchy has been applied to the terrestrial fauna EPA objective and further mitigations include:

Avoid

- Avoid wherever possible clearing of the Carnaby's Cockatoo foraging habitat, locallyimportant fauna habitat.
- No Malleefowl mounds, Chuditch dens or Red-tail Phascogale hollows have been located within the Development Envelope or Study areas, thus none will be removed.
- Utilise existing exploration disturbance wherever possible.
- No groundwater water will be released in the Munglinup River by the Project, no direct impacts will occur.

Minimise and Manage

- Potential impacts to terrestrial fauna will be minimised through the implementation of the Terrestrial Fauna Management Plan (Appendix F).
- Include information of fauna habitat and fauna species, including conservation significant species, within the site induction.
- Maintain a record of fauna mortalities, injuries and translocations using this information to identify problem areas and solve issues which may be impacting on fauna.
- Undertake pre-clearing checks for fauna and undertake clearing outside of breeding seasons, where possible.
- Appropriate management of infrastructure during operations such as periodic inspection for trapped fauna within the TSF.
- Appropriate management of water infrastructure during operations including once daily checks for trapped fauna within dams and dewatering infrastructure, and the installation of appropriate fauna egress material within water infrastructure.
- Appropriate management of excavation activities during construction including the construction of ramps to allow fauna to escape and risk assessing potential open trenches.
- Restrict vehicle speeds on all Project internal and access roads.
- Manage waste appropriately to ensure fauna do not have access to food waste or rubbish.
- Consider contributing to feral animal management programs.
- Develop a management plan to manage impacts to conservation significant fauna.
- Maintain firebreaks to assist with fire management and control.
- Lighting designed to illuminate designated operations areas rather than the surrounding landscape.
- The potential indirect impacts upon fauna including those listed as MNES are like those listed described for all flora and vegetation. Fire risk will be minimised by undertaking clearing outside extreme fire risk periods and with fire mitigation equipment on standby.
- The minimising of impacts to terrestrial fauna will be managed by implementing the Terrestrial Fauna Management Plan (Appendix F).

Rehabilitate

- Undertake progressive rehabilitation where possible.
- Utilise the return of branches and vegetation to rehabilitated areas to create fauna habitat niches.
- Undertake rehabilitation monitoring which includes fauna use of rehabilitated areas.

5.4.6 Assessment of Impacts

Fauna death, injury or displacement

Fauna within the development envelope are at risk of death, injury or displacement due to clearing, interactions with vehicles and machinery and other mining activities. Fauna will be most at risk of death, injury and displacement during clearing activities. Protocols relating to clearing practices will need to be considered and implemented to reduce fauna injury and death. The implementation of management measures for vehicle operation will also be required to reduce the likelihood of vehicle strikes resulting in death or injury to fauna.

Within the development envelope, 17ha of mapped Carnaby's Cockatoo foraging habitat may be impacted by the Project, however it is likely the cockatoos will continue to use the surrounding foraging habitat and avoid the main mining operation area (Western Ecological, 2020b).

Habitat loss and fragmentation

The Project area occurs within a large intact area of vegetation surrounded be predominantly cleared farming and agriculture areas. The Project will result in the direct loss of up to 350ha (Table 5-9) of fauna habitat within a development envelope of 650ha. The primary habitat type within the development envelope is the Mallee Shrubland (494ha). Habitat and vegetation loss will somewhat reduce the connectivity between vegetation patches and corridors to the north and south. There is the potential for habitat loss and fragmentation which may influence fauna dispersal and use within the vicinity of the Project and surrounding vegetated area.

Table 5-9 Disturbance Footprint Direct Vegetation Loss (ha)

Habitat Type	Habitat Description	Area (ha/%)
Mallee Shrubland	Low overstorey of the mallees *Eucalyptus flocktoniae* and *E. uncinata*, over a dense understorey of mixed *Acacia* and *Melaleuca* shrubs. Large areas of the mallee shrubland habitat type have been burnt quite recently and are still in moderately early stages of fire regrowth.	259 / 16.62
Open Mallee Shrubland	Dense overstory of *Eucalyptus platypus* and *E. dielsii*, with an open understorey comprising *Acacia* and *Melaleuca* shrubs, occasionally forming small thickets.	6.02 / 1.43
Eucalyptus Woodland	Open sparse overstory of *Eucalyptus* spp. over mixed *Acacia, Melaleuca* and *Micromyrtus* shrubland.	9.16 / 4
Tall Mallee Shrubland	Overstory of *Eucalyptus occidentalis* woodland with isolated *Allocasuarina huegeliana.* A moderately dense understorey of mixed *Acacia* spp. and sheoaks is present with ground cover of low shrubs, sedges and halophytes.	45.67 / 44.41
Major Drainage Line	This habitat type shares some similarities with the drainage line habitat type but is generally drier with less surface water present. Vegetation is characterised by similar species to the drainage lines habitat type with a more open overstory and relatively sparse ground cover.	0 / 0
Drainage Line	Consists of a scattered *Eucalyptus* spp, overstory with a dense understorey of *Melaleuca* shrubs.	0.14 / 0.37

It is unlikely the Project would have a significant impact on the Chuditch or Malleefowl populations dispersal in the region. This is based on the removal of 9.16ha (4%) of the possible Chuditch foraging habitat and 9.16ha (4%) of the possible Malleefowl breeding habitat and 310.7ha (14.7%) of the possible foraging habitat within the Study Area, however, clearing would not impact any known mounds. There is a low potential that Chuditch movement along the Munglinup River Corridor may be temporarily impact through Project activities near the river. The proposed clearing is unlikely to cause a long-term decrease in Chuditch or Malleefowl populations and dispersal in the region due to the nature of usage in the area. By restricting clearing to the disturbance envelope, even with the impacts of fragmentation and edge effect, dispersal through the ecological linkage around the project is not expected to be impacted. Most animals are likely to become a custom to the noise and recommence usage within a couple of years.

Introduced Species
Introduced species are already present within the region and were recorded within the development envelope. Human activities in the area have the potential to attract and increase introduced species and populations. Increased presence of introduced species could have significant impacts to native fauna, particularly from predation.

Dust, Light, Noise and Vibrations
Mining activities will result in the generation of dust, light, noise, and vibration emissions which can disturb or displace fauna. This can result in fauna avoiding habitat within the areas impacted by these emissions and effectively reducing the amount of available habitat within an area. The development envelope is surrounded by farmland and with limited vegetation areas where impacted fauna could effectively move to. However, given the relatively small scale of the operation, it is likely that noise, light and vibration emissions will be minimal, whereas dust emissions can be managed through dust suppression activities. To assist with controlling emissions, the process plant has been designed to be contained within a series of buildings.

Bushfire
There is potential for fires to be triggered by mining activities. The surrounding vegetation within the Project area has a varied fire history from unknown ignition sources (most likely lightning strikes). The highest risk of bushfire ignition occurs during clearing activities. Effective management of clearing activities will prevent the incidence of bushfire. The maintenance of firebreaks will also help to control bushfire.

5.4.7 Predicted Outcome

The proposed Project disturbance footprint and development envelope have been to limited impacts on Significant species habitats were possible. No known Malleefowl mounds, Chuditch Dens, Red-tailed Phascogale hollow or Carnaby Rostering Trees will be removed. The clearing associated with the Project will be relatively small; it is acknowledged that the proposed activities could fragmentation of fauna habitats within the Munglinup Reserve which is within an already fragmented landscape.

The Project will:

- remove 9.16ha (4%) of possible breeding and 310.7ha (14.7%) of possible Malleefowl foraging habitat (this species was recorded in 2014.
- remove 9.16ha (4%) of possible Chuditch foraging habitat (this species may use the Project area but has not be confirmed as present.
- remove 6.02ha (1.43%) of Open Mallee Shrubland used by Carnaby's Cockatoo for foraging.
- remove 9.16ha (4%) of possible Red-tailed Phascogale foraging habitat (this species may use the Project area but has not be confirmed as present.

With the implementation of the above listed mitigation measures and offsets proposed for the loss of Malleefowl habitat and loss of TEC the EPA objective '*to protect Terrestrial Fauna so that biological diversity and ecological integrity are maintaine*d' can be met.

5.5 Environmental Factor – Inland Waters

5.5.1 EPA Objective

The EPA objective for Inland Waters is to '*maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected'.*

5.5.2 Policy & Guidance

The following guidance are relevant to this objective:

- Environmental Factor Guideline: Inland Waters (EPA, 2018b).

5.5.3 Receiving Environment

The following studies examining the hydrology and hydrogeology within the development envelope were completed:

- Rockwater, 2018, Desktop hydrology assessment (Rockwater, 2018a);
- Rockwater, 2018, Desktop hydrogeology assessment (Rockwater, 2018b);
- WRM, 2018, Aquatic values of the Munglinup River desktop assessment and aquatic fauna survey (Wetland Research and Management, 2018);
- Rockwater, 2019, Stage 2 Hydrogeological Assessment (Rockwater, 2019);
- Rockwater, 2020, Hydrological Review - Report for MRC Graphite Pty Ltd (Rockwater, 2020a); and
- Rockwater, 2020, Stage 3 Hydrogeological Assessment (Rockwater, 2020b).

Surface Water

The Project is located to the east of the Munglinup River which flows through M74/245 and meets the Oldfield River south of the town of Munglinup. At its closest point the Munglinup River is located 40m from the Halberts South pit. The water quality of the Munglinup River can be considered saline, alkaline, clear and well oxygenated (Wetland Research and Management, 2018). Concentrations of heavy metals are mostly below the limit of detection and are not of ecological concern (Wetland Research and Management, 2018).

In 2018, Rockwater completed a desktop hydrology assessment which used existing climate data and Google Earth 5m contours to estimate the potential flood impact of the proposed site infrastructure (Rockwater, 2018a). Based on the 2020 Detailed Hydrological Assessment undertaken by Rockwater (2020a) it is evident from the flood extent maps of Munglinup River, that all mine infrastructure falls outside the 100-year ARI flood extent of the main Munglinup River waterway.

Flows are generally maintained within the creek channels for all flood events with little breakout of flows. The Project is therefore not expected to have any adverse impacts on the flood levels or flood behaviour along Munglinup River channel. However, a 1-in-100-year ARI storm event potential may impact the Halberts Main pit, thus a diversion drain will be needed to direct flows from Catchment C around the pit. The boundaries of all other pits are above the peak flows associated with a 1-in-100-year ARI event.

The proposed ROM and other mine plant and facilities are located at the top of local catchments and so will not be within the extent of flooding resulting from surface runoff. The TSF will lie within the drainage line of Catchment D, and when completed it will occupy much of the catchment. During construction, a perimeter bund will be needed to retain or redirect surface runoff.

The Hydrology Review conducted by Rockwater in 2020, reported that the excavation of pits and the construction of the tailings storage facility (TSF) will reduce the M3 catchment areas from 4.8km2 to 4.5km2 which is estimated to be a reduction the flows to the Munglinup River by 0.7m^3/s peak flow during a 1-in-5 year event and 0.3m^3/s peak flow during a 1-in-100 year event. Based on the Rockwater studies, the M3 sub-catchments represents 3.6% of the Munglinup River catchment area, it is unlikely that the proposed change in catchment will have a significant impact on Munglinup River flows (Rockwater, 2020a).

There are no Ramsar Convention designated wetlands located within the development envelope. The closest Ramsar wetland is Gore Lake located 55km to the south east. The Project will not have any direct or indirect adverse impacts on this wetland.

Groundwater

Groundwater is primarily contained in minor local aquifers within alluvium, granite gneiss and migmatite (Rockwater, 2018b). Regional groundwater levels follow the topography, ranging in elevation from 56m AHD at Munglinup to 94m AHD in bore NPBB01, approximately 0.7km north-east of the proposed mine pits. The water-table configuration indicates that the groundwater is flowing towards the Munglinup River, and towards the ocean to the south.

Groundwater levels in the western bores are similar to bed levels along the Munglinup River, indicating probable hydraulic connection between the river and the groundwater. Also, groundwater quality was similar to water quality in the river at a time of low flows (Rockwater, 2020b).

Dewatering will be required from some of the open pits and the water derived from the pits will be used on-site for activities, such as in the processing plant and for dust suppression, with any excess water stored in an evaporation pond.

Within the indicated area of impact there are no known groundwater bores that could be affected by the drawdowns. The Munglinup town water supply is sourced from a local paved catchment and will not be impacted by either the planned mining or groundwater extraction.

Additional information on hydrology is provided in Section 4.4, hydrogeology in Section 4.5 and the aquatic fauna of the Munglinup River in Section 4.11.

5.5.4 Potential Impacts

The following potential impacts are identified for inland waters (including surface and groundwater):

- Loss of catchment area draining back to Munglinup River due to the collection of potentially dirty surface runoff. The change in catchments for the Munglinup River is estimated to be less than 4% and less than 1.5% for the Oldfield River;
- Interference with flood flows along Munglinup River and Clayhole Creek;
- Flood and drainage impacts associated with the proposed road access points crossing tributaries of Munglinup River and Clayhole Creek;
- Adverse impacts on the quality of surface runoff draining from the local creek catchments to Munglinup River;
- Contamination of groundwater from spills and seepage;
- Controlled or uncontrolled discharge of water to the Munglinup River; and
- Groundwater mounding within the vicinity of the TSF.

5.5.5 Mitigation

The mitigation hierarchy has been applied to the inland waters EPA objective as outlined below.

Avoid

- Infrastructure has been located to avoid natural drainage channels where possible.
- Utilise groundwater from dewatering activities within the processing plant such that discharge to the environment is not required.

Minimise and Manage

- The potential impacts on all inland waters will be minimised through the implementation of the Inland Waters Management Plan (Appendix G).
- Diversion channels, flood-ways and culverts will be included in the detailed design of Project infrastructure.
- Undertake regular groundwater monitoring to detect changes in groundwater quality and levels as outline in the Inland Water Management Plan.
- Undertake regular monitoring of the Munglinup River water quality to detect changes that may be attributed to the Project. Monitoring will include level, quality and surface water flows.
- Undertake periodic monitoring of the Munglinup River water flow and aquatic populations to detect changes that may be attributed to the Project.
- Record abstraction and dewatering volumes.
- Store hydrocarbons and chemicals on-site within appropriately bunded areas.
- Provide spill kits at strategic locations.
- Engineer, construct, and operate the TSF in accordance DWER and DMIRS requirements.
- Undertake opportunistic surface water monitoring after rainfall events.

5.5.6 Assessment of Impacts

Surface and Groundwater Water Quality

Mining activities have the potential to cause contamination to both surface and groundwater through spills, leaks and seepage of chemical and hydrocarbons. Spills and leaks which are not appropriately

managed or cleaned also have the potential to contaminate surface water runoff. Contaminated surface water runoff has the potential to reach the Munglinup River and its tributaries altering surface water quality and aquatic fauna populations. There is also the potential for leaching and the mobilisation of metals to groundwater from the TSF, open pits and WRLs.

Extent of drawdown

The dewatering of the open pits will result in the drawdown of the water-table and could potentially result in the removal of water from localised minor aquifers. There are no subterranean within the development envelope and groundwater drawdown will not influence subterranean GDEs.

Groundwater modelling suggests at the end of mining, for a period of 15 years, groundwater-level drawdowns of at least 1m could extend approximately 2km north and 0.5km to 1.5km south of the mining area; 1 to 2km east to Clayhole Creek; and approximately 1.2km west to the assumed aquifer boundary (Rockwater, 2020b). In reality, geological boundaries are likely to limit the extent of 1m drawdowns further than the distances noted, particularly across-strike of the mining area, to the east and west.

The steady-state modelling suggests that prior to mining, groundwater discharge to the reach of Munglinup River from near bore NPB01 in the north, to west of the southern end of Halberts South, would average 37m^3/day. The rate would be lower during periods of high river flows when there would be some flow from the river back into the aquifer. This latter process would occur over a short period (a few days) with water moving up to potentially 50m laterally into the aquifer.

Pumping from bores and pit sumps will prevent some groundwater discharge to Munglinup River; and reduce river flows and ponded water volumes in the river, notably at times of low flow. The modelling results indicate that when there is water in the river, flows from the river back into the aquifer and moving towards bores and pits being dewatered would gradually increase from 233m^3/day in Year 1, to 265m^3/day in Year 12, when it would stabilise at that rate. These processes will reduce the accumulation of salt in the river due to evapotranspiration of groundwater discharge, and so are likely to reduce the salinity of water in the river during low flows (Rockwater, 2020b).

Other Groundwater Users

Within the indicated area of impact there are no known groundwater bores that could be affected by the drawdowns. The Munglinup town water supply is sourced from a local paved catchment and so cannot be impacted by either the planned mining or groundwater extraction (Rockwater, 2020b).

Groundwater Dependent Vegetation (GDEs)

It appears unlikely that any of the VUs recorded in the Study Area rely upon the local groundwater for survival, rather utilising soil stored moisture from rainfall as their primary source of water during drier months. In particular, those VUs that occur higher in the landscape such as VUs 16 and 17 that comprise the Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia TEC (Endangered – EPBC Act) are situated where the water table is located well in excess of 10m from the ground surface and therefore are not groundwater dependent (Woodman Environmental, 2020a; Rockwater, 2018b).

The local groundwater was found to be highly saline - with approximately 20,000mg/L salinity or more recorded within most bores - making it unsuitable for use by most terrestrial species. (In the context of *Eucalyptus occidentalis*, Barson & Barrett-Lennard (1995) (cited by DPIRD 2020) suggest that this species can occur in areas where soil salinity is up to 15,000 mg/L).

The remaining areas of these VUs, as well as all occurrences of VU 13, occur away from the location of bores installed as part of this study; where modelled depth to groundwater shows rapid rises to over 20m within 500m of the river and major creeks in response to topography (Woodman Environmental, 2020a).

Altered flow regimes

The establishment of new landforms and infrastructure can potentially alter drainage patterns on a local scale through changes to natural topography. This could result in additional flows from constructed landforms entering existing surface water drainage channels. Note- the location of the

TSF will result in surface water flows being diverted around the TSF. Roads may also influence on surface water flows particularly where creeks and drainage lines need to be traversed.

Based on the proposed site layout plan, there are five locations where the proposed haul/LV road network will interact with the local creeks (MR Crossing 1 to 5). Predicted peak flow for the PMF event is low (between $3m^3/s$ and $4m^3/s$) at these locations. Appropriately sized culverts should be constructed at these crossings to allow ephemeral drainage and prevent bogging due to heavy vehicle pounding (Rockwater, 2020a).

Flooding
In general, flooding from the main Munglinup River and local creeks will not adversely impact the pits, and therefore no flood protection measures are warranted. The exception is the flow path of Creek C, which will be obstructed by Halberts Main pit. The recommended remedial measure of a diversion drain is described in section 6.4.1 of the Rockwater 2020 report.

5.5.7 Predicted Outcome

The Project has the potential to impact the Munglinup River through contamination from runoff and drawdown. However, impacts to GDEs, water discharge or release, altered flow regimes or flooding are unlikely. With the implementation of the above mitigations measures, the EPA objective for Inland Waters '*to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected*' can be met.

5.6 Environmental Factor – Social Surroundings

5.6.1 EPA Objective

The EPA objective for Social Surroundings is to '*protect social surroundings from significant harm'.*

5.6.2 Policy & Guidance

The following guidance and policy is relevant to this objective:

- Environmental Factor Guideline: Social Surroundings (EPA, 2016i).

5.6.3 Receiving Environment

The following surveys have been completed within the Project area:

- Applied Archaeology Australia, 2018, Report of an Ethnographic and Archaeological Survey of Proposed Munglinup Graphite Project at Munglinup, Western Australia (Applied Archaeology Australia, 2018).

The Munglinup Graphite Project is located within the overall area covered by the Esperance Nyungar Native Title Determination (WCD2014/002), which covers a large portion of the South-Coast. Mining lease M74/245 and the development envelope are located within Mining Reserve R24714, within which Native Title has been extinguished under the determination.

Prior to 2018, no Aboriginal Heritage sites were identified within the development envelope. Applied Archaeology Australia (AAA) in consultation with the Esperance Nyungars completed a heritage survey of the Project area and identified five archaeological places and two ethnographic places which have been submitted to DPLH for assessment. These included:

- Artefact scatters;
- Ochre sources;
- Munglinup River and tributaries; and
- Rocky outcrop called Mungan Wilgie Koort.

In June 2018, the Munglinup River and associated tributaries along with Mungan Wilgie Koort were submitted to DPLH to be assessed as registered sites. In September 2018, the Munglinup River (and associated tributaries) was assessed and recognised as a registered Aboriginal Site (site number 37695).

Additional information on Aboriginal heritage and surrounding land use are provided in Section 4.12 and 4.12.4

The Project is located within the Shire of Esperance with the town of Munglinup located approximately 4km to the south of M74/245. The town of Munglinup has a population of 129 people (within the town and the surrounding farmland). Munglinup has a roadhouse, primary school and emergency firefighting depot. While the Project occurs within Mining Reserve R24714, the surrounding land use is predominantly agriculture (sheep, wheat and cereal crop farming). The Munglinup town and surrounding farms are potential receptors of noise and light emissions.

There are no World Heritage Properties or National Heritage Places within the disturbance footprint or the surrounding area. The closest National Heritage Place is the Fitzgerald River National Park 80km from the Project. The implementation of the Project will not have an impact on the Fitzgerald River National Park.

5.6.4 Potential Impacts

The following potential impacts to social surroundings have been identified:

- Damage to, or removal of, Aboriginal Heritage features.
- Noise and light impacts to sensitive receptors.
- Increased traffic on local road networks and South Coast Highway.
- Positive socio-economic benefits to Munglinup and nearby towns (Esperance and Ravensthorpe).
- Change in the visual amenity

5.6.5 Mitigation

The mitigation hierarchy has been applied to the social surroundings EPA objective as outlined below.

Avoid

- Where possible Aboriginal Heritage features have been avoided and 'no-go areas' established.
- Undertake visual inspections before clearing activities or during excavation activities to check the ground for new Aboriginal Heritage features.
- The internal site clearing procedure will include checks for heritage features including registered sites and points identified during heritage surveys/ ground clearances.

Minimise and Manage

- Ensure employees are made aware of Aboriginal Heritage features and 'no-go areas' within the Project and are aware of the legal requirements in relation to Aboriginal Heritage sites.
- Undertake a desktop noise assessment.
- Undertake dust suppression activities.
- Implement an effective public comment and complaint communication system to ensure concerns received are recorded and acted upon.

Rehabilitate

- Undertake progressive rehabilitation where possible.
- Rehabilitation aims to blend the shape and vegetative cover of landforms with the surrounding landscape.

5.6.6 Assessment of Impacts

Aboriginal Heritage

Several Aboriginal Heritage features such as artefact scatters and individual archaeological finds occur within the development envelope and disturbance footprint. Features which have been submitted to DPLH for assessment and have been recognised as Aboriginal Sites will require Section 18 clearances (noting that the current Project Area is subject to an existing section 18 consent). Unfortunately, some Aboriginal Heritage features cannot be avoided.

Noise & Light Emissions

Primary sources of noise will include the processing plant, vehicle and machinery operation and blasting activities. There is potential for noise emissions to travel through the surrounding valleys and impact people or houses in the receiving area. MRC Graphite will operate on a day-shift only roster for mining with a 24-hour operating ROM and processing plant. A desktop assessment of noise emissions has been commissioned and will provide additional information on potential noise emissions associated with the Project and sensitive receptors.

The primary sources of light emissions will be the 24-hour operating plant. Given the distance to receivers, the low population density and the presence of vegetation buffering around the Project, it is unlikely light emissions will impact surrounding land users and neighbours. Significant parts of the processing plant will also be contained within sheds to further reduce noise and light emissions.

Amenity

The increased traffic on local roads and highways could result in reduced amenity for local drivers utilising these roads, as well as neighbouring properties. Road train movements transporting graphite to Esperance are likely to be nine triple trailer road trains per day. The preferred route from the infrastructure area will allow trucks to bypass the town of Munglinup. The increase of nine trucks per day is unlikely to have a noticeable impact to users of the South-Coast highway.

Socio-Economic Benefits

The Project will directly employ a workforce of 110 people during operations. An additional number of mining contractors will be required and is likely to number 20 to 25 employees. The workforce will be sourced from the surrounding towns of Ravensthorpe and Esperance or relocated to Esperance to allow for bus-in, bus-out shifts. The construction phase of the Project also aims to source contracts with local businesses. This work will have a local economic benefit for Munglinup and a regional economic benefit for Ravensthorpe and Esperance through increased employment and engagement of local contractors.

5.6.7 Predicted Outcome

The Proposal will result in the removal of some Aboriginal Heritage features which are located within the footprint of the open pits, and portions of registered Aboriginal Site 37695 that are impacted by the proposed development. MRC Graphite will apply for additional Section 18 for sites assessed and recognised by DPLH.

The Project is unlikely to have visual amenity impacts to the surrounding area as the landforms and activities will be shielded by a buffer of native vegetation. There remains potential for noise and light emissions to impact some surrounding neighbours. The extent of this is unknown and efforts will be made to further understand these potential impacts. The placement of the plant within a shed will somewhat reduce these impacts.

MRC Graphite is confident that the Project will meet the EPA objective '*to protect social surrounds from significant harm*'.

6 Other Environmental Factors and Values

6.1 Other Environmental Factor– Short Range Endemic Fauna

6.1.1 EPA Objective

The EPA objective for Terrestrial Fauna is to '*protect terrestrial fauna so that biological diversity and ecological integrity are maintained'.*

6.1.2 Policy and Guidance

The following policy and guidance is relevant to this objective:

- Environmental Factor Guideline: Terrestrial Fauna (EPA, 2016c).
- Technical Guidance: Sampling of Short-range Endemic Invertebrate Fauna (EPA, 2016g).

6.1.3 Receiving Environment

The following studies examining SRE fauna within the development envelope have been completed:

- Biota, 2018, Munglinup Graphite Project Terrestrial Short-Range Endemic Fauna Pilot Study (Biota Environmental Sciences, 2018b).
- Invertebrate Solutions, 2020, Survey for Short Range Endemic Fauna for the MRC Graphite Project, Munglinup, Western Australia (Invertebrate Solutions, 2020a).
- Invertebrate Solution, 2020, Munglinup Graphite Short Range Endemic Impact Assessment Technical Memorandum (Invertebrate Solutions, 2020b).

Biota staff undertook a SRE pilot study in May 2018, surveying 12 sites using a combination of active searching methods, specifically targeting mygalomorph spiders, millipedes and terrestrial snails (Biota Environmental Sciences, 2018a). The pilot study identified seven different SRE habitats based upon previous vegetation mapping by Ecologia (2015) and an on-ground assessment by Biota staff.

The pilot survey identified 3 potential SRE mygalomorph spiders - *Aname* sp. *indet.* (Nemesiidae), *Proshermacha* sp. *indet.* (Nemesiidae) and *Idiopidae* sp. *indet.* (Idiopidae), however, due to the specimens being juvenile or female none were able to be identified beyond generic level or assigned any definite SRE status. Biota (2018) did, however, note that all potential SRE spiders were located within multiple habitat types, provided by Biota (2018) that indicate that the species are not habitat specific and are not restricted to the Study Area.

The 2019 SRE field survey conducted by Invertebrate Solutions (Invertebrate Solutions, 2020a) recorded 247 individual specimens representing 25 taxa of invertebrates from six classes, 11 orders and 19 families that have the potential to contain SRE taxa. No Confirmed SRE species were recorded during the field survey. This survey also brought the SRE habitat in line with the 2019 Woodman Report.

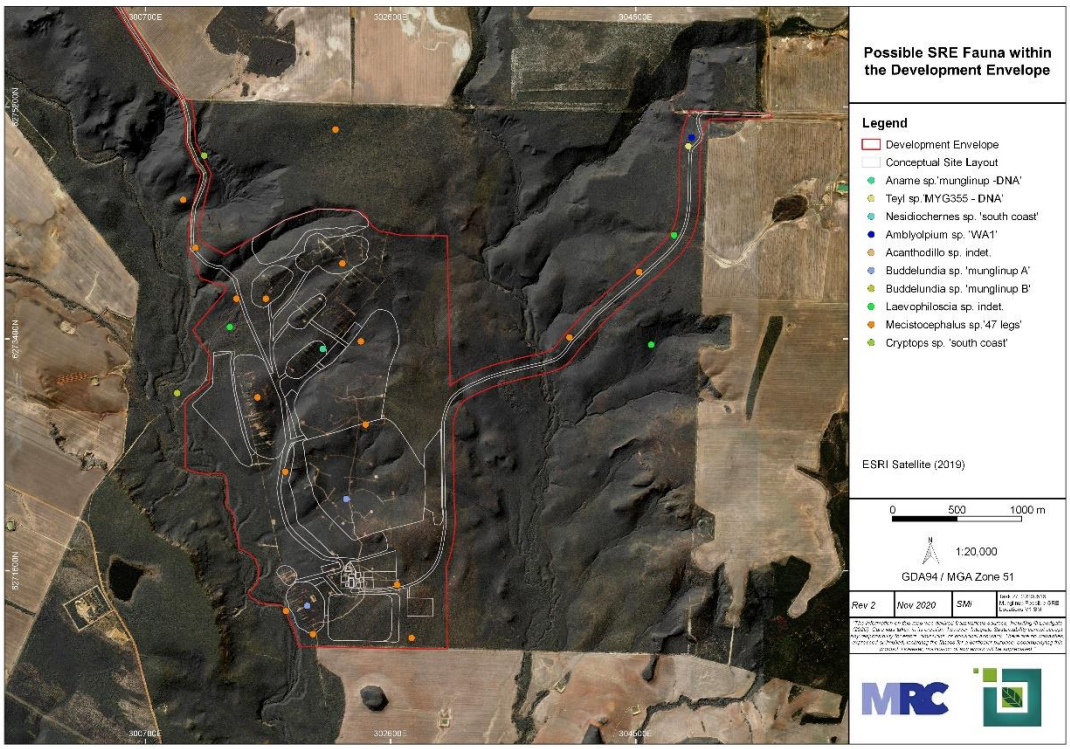


Figure 4-31 "Possible" SRE within the Development Envelope

Table 4-22). These 14 taxa included no Confirmed SRE species, four Likely SRE species and 10 Possible SRE species. The majority of the species determined to be Possible SRE taxa is due to incomplete taxonomy and unknown species distributions. All the Possible SRE species are known to occur more widely in the region or were often recorded at multiple locations during the survey indicating their distributions are wider than the current survey could determine (Invertebrate Solutions, 2020b).

Survey Effort

The total survey effort for SRE within the project area is presented in Table 6-1.

Table 6-1 SRE Survey Effort within the Project Area

Survey Effort	Biota 2018	Invertebrate Solutions 2019	Western Ecological 2019a
Duration of Survey	5 days (May 2018)	5 days (October 2019)	10 days (November 2019)
Search Type	Targeted searches, leaf litter searches	Litter sifting in Tullgren funnels, hand searching	12 Dry pitfall trap sites – 5 traps at search site
Searches	12 sample sites (36 person Hours)	30 sample sites (30 person Hours Active Searching)	-

Survey Limitations

Table 6-2 presents the limitations of the Western Ecological survey of the study area in accordance with EPA (EPA, 2016g).

Table 6-2 Survey Limitations of Invertebrate Solutions Surveys

Limitation	Impact on the Assessment
Sampling Effort	The single-phase survey included 30 hours of active searching and 30 leaf litter samples extracted in Tullgren funnels that provides a high degree of certainty that the majority of potential SRE invertebrates present at the time of survey were recorded from the Survey area.
Timing	The survey was undertaken in October, which is within the suggested timing for the south coast region (May – October) according to the EPA Technical Guidance – Sampling of

	short range endemic invertebrate fauna (EPA 2016). Rainfall was above average in August making for excellent conditions for sampling SRE invertebrates in October.
Methods	a wide variety of collecting techniques were used including active searching, leaf litter sieving, leaf litter extracted in Tullgren funnels, bark peeling, and dry pitfall trapping providing a high degree of certainty that the majority of potential SRE invertebrates present at the time of the survey were recorded from the Survey area. The dry pitfall trapping was undertaken as part of the vertebrate fauna survey by Western Ecological (2020) and all methods are outlined in detail the Western Ecological report. No potential SRE invertebrates were recorded during the pitfall trapping program.
Habitat Sampled	All significant potential SRE habitats within the Survey Area were sampled using a combination of techniques.
Access to Area	Minor access restrictions were encountered for the western portion of the proposed haul road route where it meets the main Development Envelope, and the eastern edge of the main Development Envelope due to extremely dense regrowth vegetation following a fire. This habitat was extensively sampled elsewhere within the Survey area and Development Envelope and found to be homogeneous for potential SRE species. No other significant access issues were encountered in the October 2019 survey.

6.1.4 Potential Impacts

The following have been identified as having the potential to impact on SRE fauna, including SRE fauna habitats:

- Vegetation clearing, directly removing and/or disturbing SRE habitat.
- Habitat fragmentation and genetic isolation due to vegetation clearing and construction works.
- Weed incursion during mine construction and operation.
- Increased sedimentation during mine construction works.
- Alteration of surface hydrology during mine construction and operation.
- Hydrocarbon spills during construction and/or operations.
- Vibration disturbance from operational and construction activities.
- Noise during construction and operational works.

6.1.5 Mitigation

The Project is restricted to the Graphite deposits and the proposed clearing of up to 350ha of fauna habitat will be minimised as much as practicable. The mitigation hierarchy has been applied to the terrestrial fauna EPA objective and further mitigations include:

Avoid

- Utilise existing exploration disturbance wherever possible.

Minimise and Manage

- Impacts from vegetation clearing to be minimised through clearly marked boundaries for clearing during construction.
- Fencing of remnant native vegetation during construction to avoid unnecessary damage by machinery, vehicles or people.
- Education/ induction of construction and mining personnel to avoid damage to adjacent vegetation.
- Leaving a corridor of remnant vegetation on the on the northern edge of the development envelope.
- The minimising of impacts to the SRE species will be managed by implementing the Terrestrial Fauna Management Plan (Appendix F).

Rehabilitate

- Undertake progressive rehabilitation where possible.

6.1.6 Assessment of Impacts

Habitat loss and fragmentation

The direct impact of habitat loss and fragmentation is considered to be a Low impact locally to SRE species as no Confirmed SRE taxa were recorded during the field survey (Invertebrate Solutions, 2020a), although four Likely SRE species were recorded. The Likely SRE species were recorded within the laterally continuous Mallee Shrubland or Eucalyptus Woodland habitats, with only a single specimen of the Likely SRE isopod species *Acanthodillo* sp. *indet.* recorded from the Proteaceous Kwongkan Shrubland habitat that is largely outside of the MRC Graphite development envelope.

The impacts from vegetation clearing can be minimised through clearly marked boundaries for clearing during construction, fencing of remnant native vegetation during construction to avoid unnecessary damage by machinery, vehicles or people and education/ induction of construction and mining personnel to avoid damage to adjacent vegetation.

The indirect impact of the clearing of native vegetation causing fragmentation of the remaining vegetation may lead to the restriction of genetic flow for SRE species that have limited dispersal capabilities. This indirect impact is the most significant impact from the MRC Graphite Project. Habitat fragmentation has a much greater potential to impact SRE species due to their inherent lack of dispersal capability that allows other more mobile species to move between remnant vegetation patches in an agricultural mosaic. This impact is largely unavoidable but is mitigated by the proposed development envelope not entirely dissecting the remnant vegetation and leaving some corridors on the northern edge of the SRE survey area to the north of the proposed development envelope.

Fauna death, injury or displacement

Fauna within the development envelope are at a low risk of death, injury or displacement due to clearing, interactions with vehicles and machinery and other mining activities. Fauna will be most at risk of death, injury and displacement during clearing activities. Protocols relating to clearing practices will need to be considered and implemented to reduce fauna injury and death.

Bushfire

There is the potential for fires to be triggered by mining activities. The surrounding vegetation within the Project area has a varied fire history with unknown ignition sources (most likely lightning strikes). The highest risk of bushfire ignition occurs during clearing activities. Effective management of clearing activities will prevent the incidence of bushfire. The maintenance of firebreaks will also help to control bushfire. The risk locally to SRE is considered Low.

Invasive Flora Species

Increased local weed incursion into native bushland can have a significant impact upon SRE species that rely on sometimes small microhabitats within the landscape. This has the potential to cause a Low/Moderate impact to SRE fauna and is the second most significant indirect impact to SRE fauna. This impact can be managed through management and mitigation measures including general ongoing weed control.

Chemical/ Hydrocarbon Spill

The potential for contamination during construction is limited to isolated areas of chemical storage and small quantities of hydrocarbons where machinery or generators are working. Risks will be minimised by measures included the site operating procedure. The risk of contamination during operations is minimal with appropriate drainage design and emergency spill response protocols in place to minimise the likelihood of large spills moving beyond operational areas into native vegetation. Where management measures are implemented, the risk of hydrocarbon contamination to SRE species and habitat is Low.

Hydrology Regimes/ Sedimentation/ Water Quality

If not managed appropriately, increasing sedimentation and alteration of surface hydrology has the potential to affect SRE fauna such as mygalomorph spiders living in burrows at ground level. Sedimentation can be managed by appropriate stormwater runoff design and during construction via management and mitigation measures. The risk of altered hydrology regimes, sedimentation and water quality locally on SRE is considered to be Low.

Noise and Vibration

Vibration and noise from the construction and ongoing operation of the mine is expected to be minimal, especially beyond the immediate vicinity of the pits and processing areas. These impacts are considered to be Low.

6.1.7 Predicted Outcome

At a regional scale across the South Coast of Western Australia, the direct and indirect impacts are generally considered to be low due to the very small size of the MRC Graphite Project and the presence of similar habitat values in surrounding vegetation and surrounding conservation estates. Habitat fragmentation, either direct or indirect, is considered to potentially be the most significant impact at a regional scale and this impact is still considered to be Low.

The primary cumulative impact from the development is land clearance. The MRC Graphite Project is not expected to significantly add to the cumulative impacts to SRE fauna in the local area as none of the habitats identified provide isolated habitat areas likely to contain SRE taxa within the limited extent of the Project area. All the vegetation units are laterally continuous within the region and not limited to the Project area.

6.2 Other Environmental Factors and Values – Ecological Linkage

6.2.1 EPA Objective

The EPA objective for Flora and Vegetation and Terrestrial Fauna is to '*protect flora, vegetation and terrestrial fauna so that biological diversity and ecological integrity are maintained'.*

6.2.2 Policy and Guidance

The following policy and guidance are relevant to this objective:

- Environmental Factor Guideline: Terrestrial Fauna (EPA, 2016c).
- Technical Guidance: Sampling of Short-range Endemic Invertebrate Fauna (EPA, 2016g).
- Environmental Factor Guideline – Flora and Vegetation (EPA, 2016a).
- Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b).

6.2.3 Receiving Environment

The following study examining the ecological linkage values of the Munglinup River Corridor was completed:

- McQuoid N. and Neville S. (2020) *Ecological Linkages/Biodiversity Corridors Impact Assessment: Munglinup, Oldfield and Young River Corridors.* Munglinup Graphite Project, MRCG (McQuoid & Neville, 2020).

The 2020 ecological linkages assessment conducted by Nathan McQuoid and Simon Neville of Ecotones Ltd was commissioned by MRC Graphite to assess the ecological linkage values of the Munglinup River Corridor and the potential impact of the Project on the linkage in comparison to the Oldfield and Young River corridors.

Twenty-two vegetation types were identified across the three linkage corridors. Vegetation types '*tallerack kwongkan proteaceae rich 3'*, '*tallerack kwongkan 5'* and '*kwongkan shrubland 7'* were grouped into a common kwongkan Type 3, as the three were ecologically similar and not distinguishable from each other using available aerial imagery. *'Mallet/moort woodland 1'* and *'1B', 'tallerack kwongkan proteaceae rich* (now kwongkan) 3' and '3B', and *'mallee shrubland 6'* and '6B' were combined into plain '1', '3' and '6' types, as their 'B' condition ratings were associated with being relatively recently burnt; and as a temporary natural impact, this was not considered important for the mapping or MCAS-S analysis. The 'yate woodland 8B' rating was retained, as it related to minor degradation as a likely permanent weed presence, and 'melaleuca shrubland 2C' and 'tallerack kwongkan proteaceae rich shrubland (now kwongkan) 3C' were retained.

The results of the MCAS-S and LCP analysis clearly indicated, of the three linkages, the Munglinup Linkage had the highest linkage values and is the largest linkage area. The Young linkage had the next highest value. The LCP analysis showed the Munglinup linkage is the preferred path from the coast to the Great Western Woodlands, with the Oldfield being a close second. Post mining, the LCP analysis favours the Munglinup linkage.

6.2.4 Potential Impacts

The following potential impacts to the ecological linkage values of the Munglinup River Corridor were identified:

- Vegetation clearing, directly removing and/or disturbing habitat.
- Habitat fragmentation and genetic isolation due to vegetation clearing.
- Corridor fragmentation or encroachment could affect species and gene flow through the region.
- Isolation of approximately 1000ha of native vegetation of the eastern sides of the development envelop.
- Degradation of vegetation and vegetation communities along the corridor boundary resulting in an edge effect.
- Weed incursion during mine construction and operation.
- Reduced corridor usage to noise and vibration during construction and operation.

6.2.5 Mitigation

The mitigation hierarchy has been applied to the EPA objective as outlined below.

Avoid

- Clearing within the main Munglinup River Corridor.
- Clearing activities will be managed to ensure clearing is strictly limited to that necessary for operations, such as using survey pegs and flagging tape to mark clearing boundaries and maintaining a ground disturbance register.

Minimise and Manage

- Retain vegetation corridor running east-west allowing for the movement of species and gene flow from the unimpacted vegetation in the Munglinup Mining Reserve.
- Education/induction of construction and mining personnel to avoid damage to adjacent vegetation.
- Support NRM activities in the region that focus on the linkage corridors.

Rehabilitate

- Restoration following mining disturbance, focusing on mallet woodland communities as an important habitat for Conservation Significant fauna.
- Restoration of other vegetation types including the Kwongkan and mallee types.
- Develop a restoration plan with focus on habitat type, to be developed and implemented by an entity with competent expertise on topsoil and propagule conservation.

6.2.6 Assessment of Impacts

The ecological linkage assessment indicated the Munglinup River Corridor has the highest Linkage values and is the largest linkage area – both results are strongly influenced by the inclusion of the Cheadanup Reserve to complete the linkage to the Great Western Woodlands. The Munglinup linkage has a mean value – modelled for both before and after the proposed mine – exceeding the other two linkages. The Young linkage has the next largest value, significantly below the Munglinup, and the Oldfield has the least. The sinuous shape of the Young affects its average values, which are lower than the Oldfield.

The LCP analysis also shows the Munglinup Linkage to be the preferred linkage pathway from the coast to the Great Western Woodlands. The sensitivity analysis shows the Oldfield is close second. A major part of this closeness is due to the way the LCP analysis treats cleared areas, with LCP values for cleared

area being very high to ensure the path follows the linkages. The Munglinup Reserve has two large gaps towards the top of the linkage (~1800m combined), whereas the LCP interprets the Oldfield as having smaller gaps (~600m) in the centre of the linkage.

Post mine, the LCP path still favours the Munglinup, but the difference between the two linkages is less. Post-mine revegetation of the major cleared areas would significantly improve the Munglinup Linkage. The Young Linkage is far less preferred by the LCP in both scenarios.

6.2.7 Predicted Outcome

The potential to impact the Munglinup River Corridor through direct impact from clearing is limited because the Project will remain outside the main vegetation corridor. Through the ecological linkage modelling it has been indicated that the overall Munglinup Linkage could be reduced by 10%. This modelling is considered a worst-case scenario; and it believed that impacts can be reduced by implementing the mitigation and management measures proposed.

The impacts of the proposed Project could be reduced by:

- quality rehabilitation following project disturbance,
- conservation arrangements with landholders, and
- NRM activities and resource being allocated to the linkage corridors.

6.3 Other Environmental Factors and Values – Aquatic Fauna

6.3.1 EPA Objective

The EPA objective for Terrestrial Fauna, and Inland Waters in which aquatic fauna is considered, is to '*protect terrestrial fauna so that biological diversity and ecological integrity are maintained*'and to *'maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected'* respectfully.

6.3.2 Policy and Guidance

The following guidance are relative to this objective:

- Environmental Factor Guidance: Terrestrial Fauna Surveys (EPA, 2016c)
- Environmental Factor Guidance: Environmental Factor Guideline: Inland Waters (EPA, 2018b)
- Technical Guidance: Sampling of short range endemic invertebrate fauna (EPA, 2016g)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2020)

6.3.3 Receiving Environment

The following aquatic fauna studies have been completed:

- WRM, 2018. Aquatic Ecological Values of the Munglinup River: Literature Review. (Wetland Research and Management, 2018a)
- WRM, 2018. Baseline Water Quality and Aquatic Fauna Survey. April 2018. Final Report. (Wetland Research and Management, 2018)

In 2018 MRW was contracted to undertake a desktop review if the Project area, in order to document known water quality and aquatic fauna values of the Munglinup River. The desktop review was compiled to complement the autumn baseline survey that was also completed by WRM. The primary purpose for each of these studies was to understand the importance of a range of ecological values of pools in the Munglinup River and the local/regional distribution of the same values.

The desktop review found that the Munglinup River was of low-moderate regional conservation value, largely due to past disturbances, including catchment clearing and agricultural land uses practices. Salinity and to a lesser degree nutrient enrichment, were found to be the main factors influencing the diversity and composition of aquatic fauna in rivers of the Eastern South Coast bioregion.

Only two species listed under the WC Act were considered likely or possible to occur in the Munglinup River: the rakali (water rat) and the south-western snake neck turtle. Endemic species of fish, crayfish and frogs which occur, or have the potential to occur in the Munglinup River have a documented wider distribution across the South Coast Region.

The baseline study concluded that the Munglinup River can be considered to be of moderate conservation value. While spot sampling of water quality and aquatic fauna suggests the Munglinup River's ecological values are comparable to other naturally salinized systems in the Eastern South Coast Bioregion, but has a lower ecological value of freshwater systems of the Western South Coast bioregion. Diversity of macroinvertebrates and fish is comparable to that recorded at nearby naturally salinized river systems east of the Pallinup River, but lower than freshwater systems in South West Australia.

Species considered sensitive receptors of freshwater environments were typically absent due to background salinity, with a suite of salt-tolerant fauna recorded. No species recorded from spot-sampling are currently listed under state or federal conservation acts and the system is unlikely to provide significant habitat for conservation significant species in a local/regional setting. Although the Common Jollytail is (*Galaxias maculatus*) is not listed under state or federal conservation acts, it is noteworthy there is a healthy population of the species in the Munglinup River, being it has a very limited distribution in Western Australia (Wetland Research and Management, 2018).

6.3.4 Potential Impacts

The following have been identified as having the potential to impact on aquatic fauna in the Project area:

- Loss of catchment area draining back to Munglinup River due to the collection of potentially dirty surface runoff. The change in catchments for the Munglinup River is estimated to be less than 4% and less than 1.5% for the Oldfield River;
- Interference with flood flows along Munglinup River and Clayhole Creek;
- Flood and drainage impacts associated with the proposed road access points crossing tributaries of Munglinup River and Clayhole Creek;
- Adverse impacts on the quality of surface runoff draining from the local creek catchments to Munglinup River;
- Contamination of groundwater from spills and seepage;
- Controlled or uncontrolled discharge of water to the Munglinup River; and
- Groundwater mounding within the vicinity of the TSF.

6.3.5 Mitigation

The mitigation hierarchy has been applied to the EPA objective as outlined below.

Avoid

- Infrastructure has been located to avoid natural drainage channels where possible.
- Utilise groundwater from dewatering activities within the processing plant such that discharge to the environment is not required.

Minimise and Manage

- The potential impacts on all inland waters will be minimised through the implementation of the Inland Waters Management Plan (Appendix G).
- Diversion channels, flood-ways and culverts will be included in the detailed design of Project infrastructure.
- Undertake regular groundwater monitoring to detect changes in groundwater quality and levels.
- Undertake regular monitoring of the Munglinup River water quality to detect changes that may be attributed to the Project.

- Undertake periodic monitoring of the Munglinup River water flow and aquatic populations to detect changes that may be attributed to the Project.
- Record abstraction and dewatering volumes.
- Store hydrocarbons and chemicals on-site within appropriately bunded areas.
- Provide spill kits at strategic locations.
- Engineer, construct, and operate the TSF in accordance DWER and DMIRS requirements.
- Undertake opportunistic surface water monitoring after rainfall events.

6.3.6 Assessment of Impacts

Surface and Groundwater Water Quality

Mining activities have the potential to cause contamination to both surface and groundwater through spills, leaks and seepage of chemical and hydrocarbons. Spills and leaks which are not appropriately managed have the potential to contaminate surface water runoff. Contaminated surface water runoff has the potential to reach the Munglinup River and its tributaries altering surface water quality and impacting the river aquatic fauna and flora populations.

Extent of drawdown

The dewatering of the open pits will result in the drawdown of the water-table and could potentially result in the removal of water from localised minor aquifers. Pumping from bores and pit sumps will prevent some groundwater discharge to Munglinup River; and reduce river flows and ponded water volumes in the river, notably at times of low flow. The modelling results indicate that when there is water in the river, flows from the river back into the aquifer and moving towards bores and pits being dewatered would gradually increase from 233m3/day in Year 1, to 265m3/day in Year 12, when it would stabilise at that rate. These processes could reduce the accumulation of salt in the river due to evapotranspiration of groundwater discharge, and so are likely to reduce the salinity of water in the river during low flows (Rockwater, 2020b).

6.3.7 Predicted Outcome

The Project has the potential to impact the Munglinup River quality and indirectly the aquatic fauna due to Project activities. By implementing the proposed management measure outline in this document and the Inland Waters Management Plan the EPA objective for Terrestrial Fauna (to '*protect terrestrial fauna so that biological diversity and ecological integrity are maintained*') and Inland Waters *('to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected*'), can be met.

7 Matters of National Environmental Significance

This chapter assesses potential impacts from the proposed project associated with Matters of National Environmental Significance (MNES) protected under the EPBC Act. Also described are the existing controls and additional treatments that the Proponent will implement through the Project design, construction, operations and decommissioning to mitigate potential impacts on MNES.

7.1 Policy and Guidance

Commonwealth approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (*EPBC Act*) is required if Matters of National Environmental Significance (MNES) are triggered. The *EPBC Act* provides for the protection of nationally and internationally significant flora, fauna, ecological communities, and heritage places. Under the *EPBC Act,* the following are considered MNES and trigger assessment as a 'controlled action':

- World heritage properties.
- National heritage places.
- Wetlands of international importance (Ramsar Convention).
- Listed threated species and ecological communities.
- Migratory species protected under international agreements.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Water resources, in relation to coal seam gas or coal mining.
- Nuclear actions (including uranium mines).

7.2 Controlled Action provision

The Munglinup Project was referred to the DoEE (now the Department of Water, agriculture and Environment – DWAE) and advertised for public comment 27 November 2018 as a potential controlled action under the EPAC Act due to impacts on listed threatened species and communities. On the 17 March 2019, the DoEE determined the Project to be a "Controlled Action" requires assessment and approval due to impacts on listed threatened species and communities (EPBC reference: 2018/8334). Specifically, the DoEE thought the Project may have significant impacts on:

- Proteaceae Dominated Kwongkan Shrubland of the Southeast Coastal Floristic Province of Western Australia – Endangered
- Western underground orchid (*Rhizanthella gardneri*) – Endangered
- Malleefowl (*Leipoa ocellata*) – Vulnerable
- Chuditch (Dasyurus geoffroii) – Vulnerable
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – Endangered
- Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) – Endangered
- Little Kangaroo Paw (*Anigozanthos bicolor* subsp. *minor*) – Endangered
- Sedge Conostylis (*Conostylis lepidospermoides*) – Endangered
- Lake King Eremophila (*Eremophila subteretifolia*) – Endangered
- Fitzgerald Eremophila (*Eremophila denticulate* subsp. *denticulata*) – Vulnerable
- Barrens Wedding Bush (*Ricinocarpos trichophorus*) – Endangered

The DoEE advised on the 11 July 2019 that under section 87 of the EPBC Act the Project would be assessed by an accredited assessment with the WA Government.

The information presented in this chapter is intended to address the Additional Information for Assessment request sent by the DotEE to the EPA (in accordance with the Bilateral agreement made under section 45 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) relating to environmental assessment [between the] Commonwealth of Australia and the State of Western Australia). The information request relates to impacts, mitigation of impacts, and consistency with Recovery and Threat Abatement Plans and Conservation Advice for the MNES listed above.

7.3 Summary of Values Relating to MNES

MRC Graphite has undertaken a number of studies in order to assess the presence of EPBC Act listed species and communities (MNES) within the Development Envelope (The studies are listed in section 4.1).

Based on the outcome of the studies the following MNES could potentially be impacted by the Project.

- Proteaceae dominated kwongkan shrublands of the southeast coastal floristic province of Western Australia (7.3.1)
- Malleefowl (*Leipoa ocellata)* – Vulnerable (7.3.3)
- Chuditch (*Dasyurus geoffroii)* – Vulnerable (7.3.4)
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – Endangered (7.3.5)
- Red-Tailed Phascogale (*Phascogale calura*) – Vulnerable (7.3.6)

7.3.1 Threatened Ecological Communities

The Proteaceae Dominated Kwongkan Shrubland Threatened Ecological Community (Kwongkan Shrubland TEC) is located along the South-Coast of Western Australia and has been listed as an endangered community under the *EPBC Act* (DoEE, 2014). Structurally this ecological community is described as shrubland, heath or mallee heath (DoEE, 2014). Key characteristics of this ecological community include having 30% or greater cover of Proteaceae species (*Banksia, Hakea, Grevillea, Adenanthos, Isopogon, Lambertia*) or two or more diagnostic Proteaceae species present that are likely to form a significant vegetation component when regenerated (Woodman Environmental, 2020a).

In 2014, Ecologia identified one vegetation community within the Project area where Proteaceae species are the dominant layer (Ecologia Environment, 2015). This vegetation community was considered to be part of the Proteaceae Dominated Kwongkan Shrubland TEC and was mapped within the northern portion of M74/245 (Ecologia Environment, 2015). In 2020, Woodman Environmental completed a field survey to refine the mapped extent of the Kwongkan Shrubland TEC within the Project area (Figure 7-1) (Woodman Environmental, 2020a). The field survey indicated the Kwongkan Shrubland TEC is represented by at least two distinct vegetation units (Woodman Environmental, 2020a). These two units are dominated by Proteaceous species varying in dominance in a mosaic pattern that responds to varying levels of sand depth at surface. Woodman noted twenty-two species of the Proteaceae family comprised significant components of the vegetation within the Kwongkan Shrubland TEC within the two communities. The most common species included *Banksia alliacea, Banksia armata* var. *ignicida, Banksia baueri* and *Lambertia inermis* var. *inermis* (Woodman Environmental, 2020a).

The Kwongkan Shrubland TEC comprises a total of 374ha of primarily pristine vegetation within the survey area (Woodman Environmental, 2020a). The majority of this is located in the north with an additional area located in the south-western corner on the western side of the Munglinup River (Woodman Environmental, 2020a). The development envelope, which is covered by this proposal, includes 33ha of the mapped Kwongkan Shrubland TEC. This 33ha includes the development of an eastern access road and upgrades to the current western access road (Table 7-1). The proposed Project infrastructure footprint is predominantly in the southern portion of M74/245 and away from the northern Kwongkan Shrubland TEC extent. The road footprint will likely impact less than 10ha; however, for the purpose of this proposal, it is assumed that all 33ha of the mapped Kwongkan Shrubland TEC will be cleared. Where possible, all efforts will be made to ensure the Project footprint minimises disturbance to the Kwongkan Shrubland TEC.

Table 7-1 Percent of Disturbance of the Kwongkan Shrubland TEC

Habitat Type	Mapped Extent in Combined Study Area Ha / %	Mapped Extent in Development Envelope Ha / %	Mapped Extent in Conceptual Site Layout Ha / %
Proteaceae Dominated Kwongkan Shrubland TEC	374 / 18.61%	33 / 8.8%	10 / 2.67%

A full impact assessment identifying all potential impacts and listing mitigation measures for impacts to flora and vegetation (including the Kwongkan Shrubland TEC) is provided in Section 5.2. No direct or indirect impacts have been predicted for the Kwongkan Shrublands due to mine dewatering. The Kwongkan Shrublands is located higher in the landscape and is not using local groundwater to survive. The greatest risk of bushfire as a result of Project activities is during clearing, clearing activities will occur for a limited period in the Kwongkan Shrubland TEC and will be managed by clearing outside extreme fire risk periods and which suitable fire suppression equipment onhand. Based on available information and this impact assessment, this Project is considered to have a moderate impact on the Kwongkan Shrubland TEC. Direct clearing will be kept to a minimum, and the majority of the known distribution within MRC Graphite tenure has, and will continue to be, avoided.

The Kwongkan Shrubland TEC extends beyond the development envelope and is highly likely to occur in other vegetation pockets in the region, Figure 7-1. The local and regional distribution of the Kwongkan Shrubland TEC is shown in Table 7-2.

Table 7-2 Local and Regional Extent of the Kwongkan Shrubland TEC

Area	Kwongkan Shrubland TEC Extent (ha)	Percentage of Study Area (%)
Conceptual Site Layout	10	2.67
Development Envelope	33	8.82
TEC within combined Study Area	374	18.61
Regional Extent	1,185,188	>0.01

MRC will implement annual vegetation health monitoring of the Kwongkan Shrubland TEC. This monitoring will be undertaken using photo monitoring and remote sensing drone monitoring. MRC will periodically undertake an audit of compliance of its hygiene procedures.

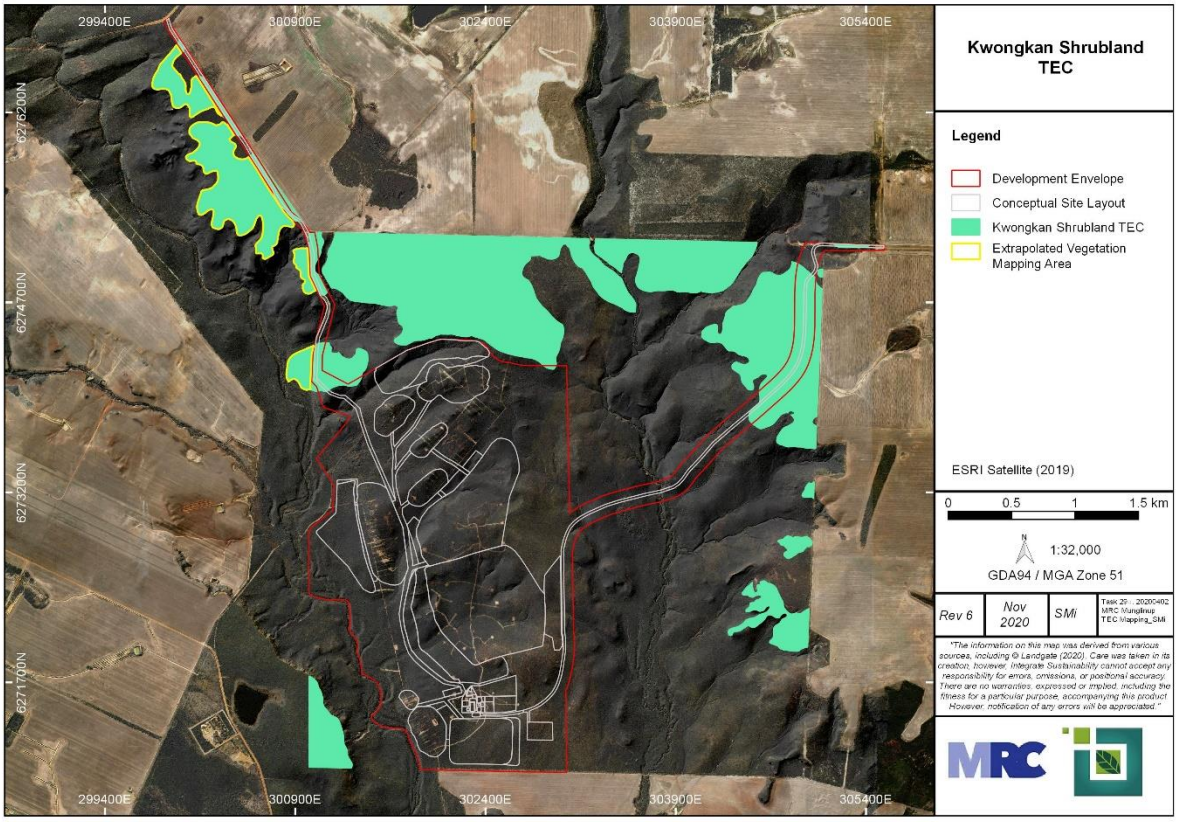


Figure 7-1 Kwongkan Shrubland TEC (Woodman Environmental, 2020a)

7.3.2 Listed Flora Species

A search of the DAWE SPRAT database (DoEE 2019a) with regard to MNES listed under the *EPBC Act* was conducted in the Desktop Study by Woodman (Woodman Environmental, 2020a). Nine flora taxa

listed as Threatened Species, or habitat for Threatened Species, identified as likely to occur in the Desktop Study Area are listed below:

- *Anigozanthos bicolor* subsp. *minor*;
- *Conostylis lepidospermoides*;
- *Eremophila denticulata* subsp. *denticulata*;
- *Eremophila lactea*;
- *Eremophila subteretifolia*;
- *Kennedia glabrata*;
- *Lambertia echinata* subsp. *echinata*;
- *Ricinocarpos trichophorus*; and
- *Roycea pycnophylloides*.

The Field Surveys conducted by Woodman Environmental in 2020, only located *C. lepidospermoides* was identified within the Study Area (Woodman Environmental, 2020a). Preferred habitat of *C. lepidospermoides* has been mapped in the development envelope. However, no locations of *C. lepidospermoides* are known to occur within 50m of the development envelope. None of these other species were located.

Another Threatened taxon *Rhizanthella johnsonii* while not recorded during any of the survey has the potential to occur as a relatively dense stands of *Melaleuca hamata*, a known host species has been observed. Woodman Environmental completed targeted flora and vegetation work within the Project area in June 2018 to define habitat potentially suitable for the Underground Orchid (*Rhizanthella johnstonii*) (Woodman Environmental, 2018b). The targeted survey for *Rhizanthella johnstonii* (T) located what was considered to be potential habitat for this species, based on the presence of relatively dense stands of *Melaleuca hamata*, a known host species. However, it was noted that the habitat differed significantly from nearby known habitat adjacent to the Oldfield River, particularly in the presence of a dense sedge layer (absent at known habitat), and a relatively heavy clay soil. The known host species *Melaleuca hamata* also never formed thickets such as those that occur at the nearby known location of this species. *Melaleuca uncinata*, another known host species, was also recorded in the Study Area, however the habitat that it occurred in was not considered to be suitable, as it occurred on the edge of granite outcrops.

Searching of the identified potential habitat at a time when *Rhizanthella johnstonii* plants are visible above-ground (July) located no plants. Based on this, and the apparently limited suitability of the potential habitat mentioned above, it is considered very unlikely that this taxon occurs in the Study Area.

A full impact assessment identifying all potential impacts to flora and vegetation including listed flora species and mitigation measures is provided in Section 5.2. Based on available information and this impact assessment, the implementation of the Project will not result in the removal of *C. lepidospermoides* populations as no locations of *C. lepidospermoides* are known to occur within 50m of the development envelope. This species is also known to occur outside of the Project area and is known from regional records (Figure 7-2). Overall, the Project is considered to pose a low risk of impact to the preferred habitat of *C. lepidospermoides* but no direct impact to individual *C. lepidospermoides* specimens. A low risk to other listed flora species is also considered as they will not be directly impacted by the implementation of the Project.

The likelihood of occurrence for all flora species recognised as MNES identified by the SPRAT or during the baseline flora survey are presented in Table 7-3 (Woodman Environmental, 2020a). Given the level of fieldwork conducted in the Study Area between 2014-2020; MRC Graphite believes that the majority of significant flora taxa occurring within the Study Area have been identified. It is therefore highly unlikely other MNES flora identified in the Desktop Study occur in the Project area and no further discussion on this topic is required.

Table 7-3 Likelihood of Occurrence for Threatened Flora Species Identified

(Woodman Environmental, 2020a)

Taxon	Status	Habitat	Likelihood of Occurrence
Anigozanthos bicolor subsp. *minor*	T	Sand often with granite. Well-watered sites.	Highly unlikely: habitat not considered to be present. Nearest record 26km south-east and south-west.
Conostylis lepidospermoides	T	Grey or yellow-brown sand over laterite.	Recorded in Study Area. Unlikely in development envelope: all potential habitat surveyed. Nearest record 15km east.
Eremophila denticulata subsp. *denticulata*	T	Alluvium, sand, sandy clay loam. Riverbeds & plains, laterite breakaways.	Highly unlikely: habitat possibly present, but distribution is to the north-west of the Study Area, nearest record 22km from Study Area.
Eremophila lacteal	T	White sandy clay loam often with limestone. Calcareous flats.	Highly unlikely: habitat not considered to be present.
Eremophila subteretifolia	T	Grey sand, loam. Edges of salt lakes, sub-saline flats.	Highly unlikely: habitat not considered to be present. Nearest record 96km north-west.
Kennedia glabrata	T	Soil pockets, sandy soils. Granite outcrops.	Highly unlikely: habitat not considered to be present.
Lambertia echinata subsp. echinata	T	Gravelly sandy loam, brown sandy loam, white-grey sand, granite, laterite. Below and between rock outcrops, slopes, hill crests.	Highly unlikely: habitat not considered to be present.
Roycea pycnophylloides	T	Sandy soils, clay. Saline flats.	Highly unlikely: habitat not considered to be present.
Ricinocarpos trichophorus	T	Sandy clay, loam. Breakaways, among sandstone rocks.	Highly unlikely: habitat possibly present, but all habitat considered to have been inspected by survey. Nearest record 28km east.

'Highly unlikely': Reasonable to expect that the taxon would not occur there considering its known proximity to the area, known habitat and habitats identified in the area.

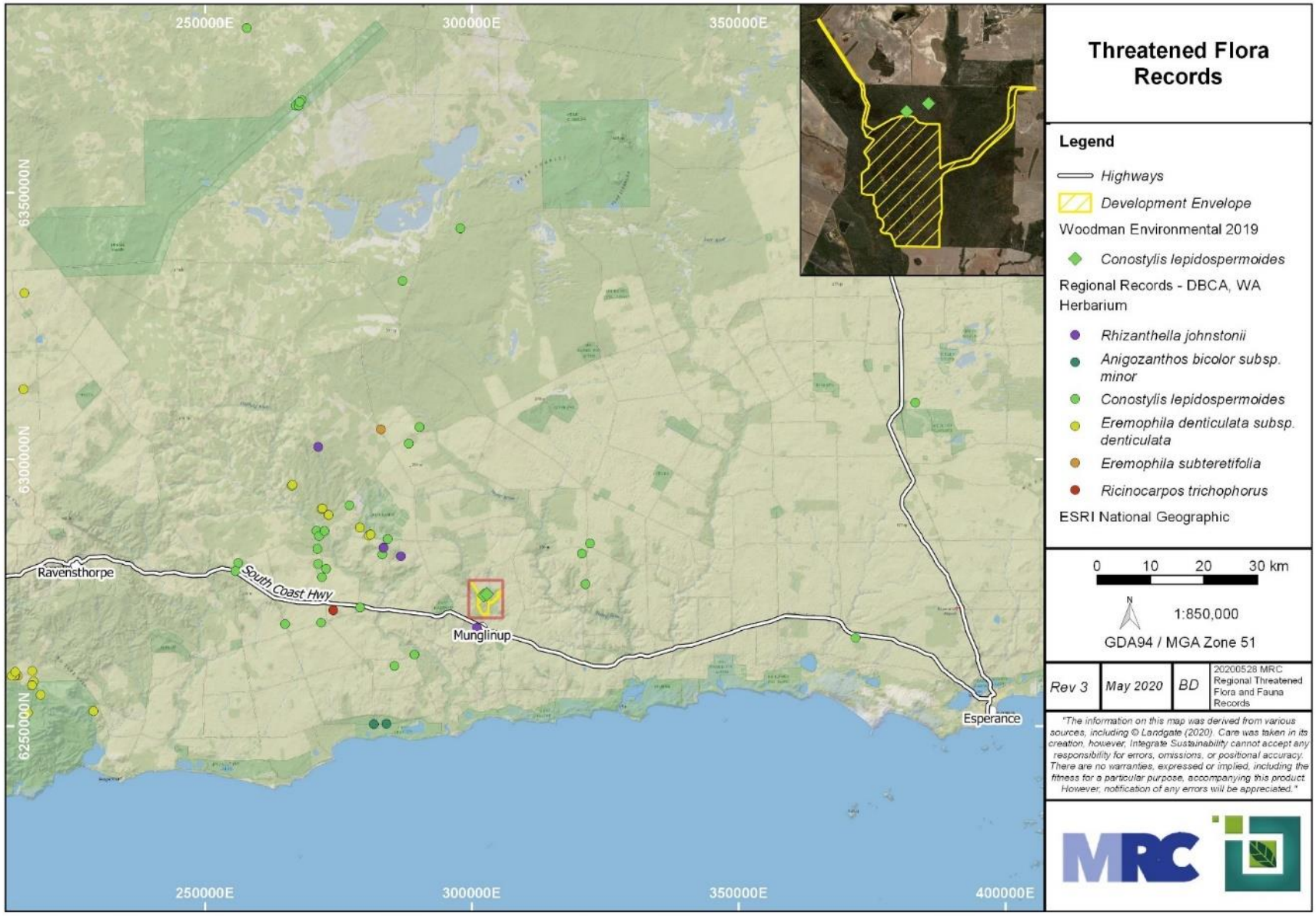


Figure 7-2 Regional Records of EPBC Listed Flora Species

7.3.3 Malleefowl

The Malleefowl (*Leipoa ocellata)* is a large, ground-dwelling bird that rarely flies (Benshemesh, 2007). The historic distribution of Malleefowl was widespread across much of the southern half of Australia (Benshemesh, 2007). The species range has contracted considerably due to clearing, predation by introduced species, fire regimes, grazing and fragmentation (Benshemesh, 2007). Within the South Coast region Malleefowl occur within mallee Eucalypt woodland with a dense discontinuous canopy and variable shrubby understorey with areas which are long unburnt (40-60 years) preferred (Red Dog Environmental, 2018a). This species is listed as Vulnerable under the *EPBC Act.*

During the 2014 Ecologia survey, a single individual was opportunistically sighted moving through Eucalypt woodland (Ecologia Environment, 2015). Six records of Malleefowl have been recorded within 30km of the Project area (Figure 7-3) (Red Dog Environmental, 2018a). No mounds have been identified in the development envelope. Extensive sections of the Project area have been recently burnt (5-10 years ago) and now have very dense vegetation that is almost inaccessible in some areas (Western Ecological, 2020a). Since 2014, 46.47ha of possible breeding habitat comprised of Eucalyptus woodland and Major Drainage line has been identified, currently these area lack of leaf litter material and is too dense for mound construction (Ecologia Environment, 2015; Western Ecological, 2020a).

Possible Malleefowl foraging habitat has been observed within the study area, and accounts for 2116.2ha of 605.62ha is located within the development envelope (Table 7-4). Some of this habitat which has been burnt, is currently within regrowth stages with very dense vegetation from ground level up to 1-2m. Malleefowl are likely to visit the Project area for foraging but are unlikely to be capable of moving through the dense regrowth areas and are likely to prefer the unburnt patches. A map of possible Malleefowl habitat (Figure 7-4) has been divided into possible breeding habitat (a combination of Eucalyptus woodland and Tall mallee shrubland) and possible foraging habitat (a combination of all the other habitat types that have been described for the Project area).

The Project will remove 4% of the possible Malleefowl breeding habitat and 14.7% of the possible foraging habitat; however, clearing would not impact any known mounds. The proposed clearing is unlikely to cause a long-term decrease Malleefowl populations in the region due to the nature of Malleefowl usage in the area.

A full impact assessment identifying all potential impacts to fauna (including listed fauna), and proposed mitigation measures is provided in Section 5.4. Based on available information and this impact assessment the Project is considered to have a low indirect impact to Malleefowl and Malleefowl habitat due to the vagrant nature of Malleefowl using the area.

Table 7-4 Percent of Disturbance of Possible Malleefowl Habitat types

Habitat Type	Mapped Extent in Study Area Ha / %	Mapped Extent in Development Envelope Ha / %	Mapped Extent in Conceptual Site Layout Ha / %
Possible Breeding	303.30 / 12.67%	46.47 / 15.32%	9.16 / 4%
Possible Foraging	2116.2 / 88.45%	605.62 / 28.62%	310.8 / 14.7%

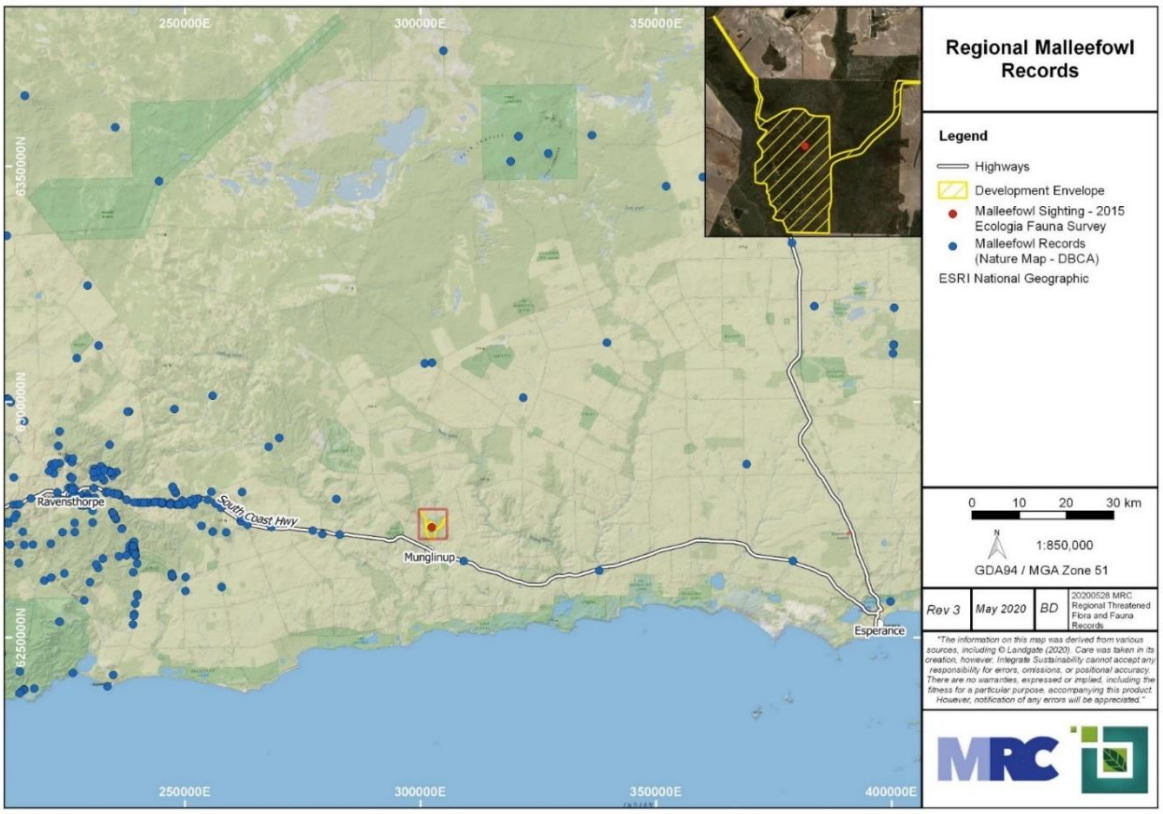


Figure 7-3 Regional Records of Malleefowl

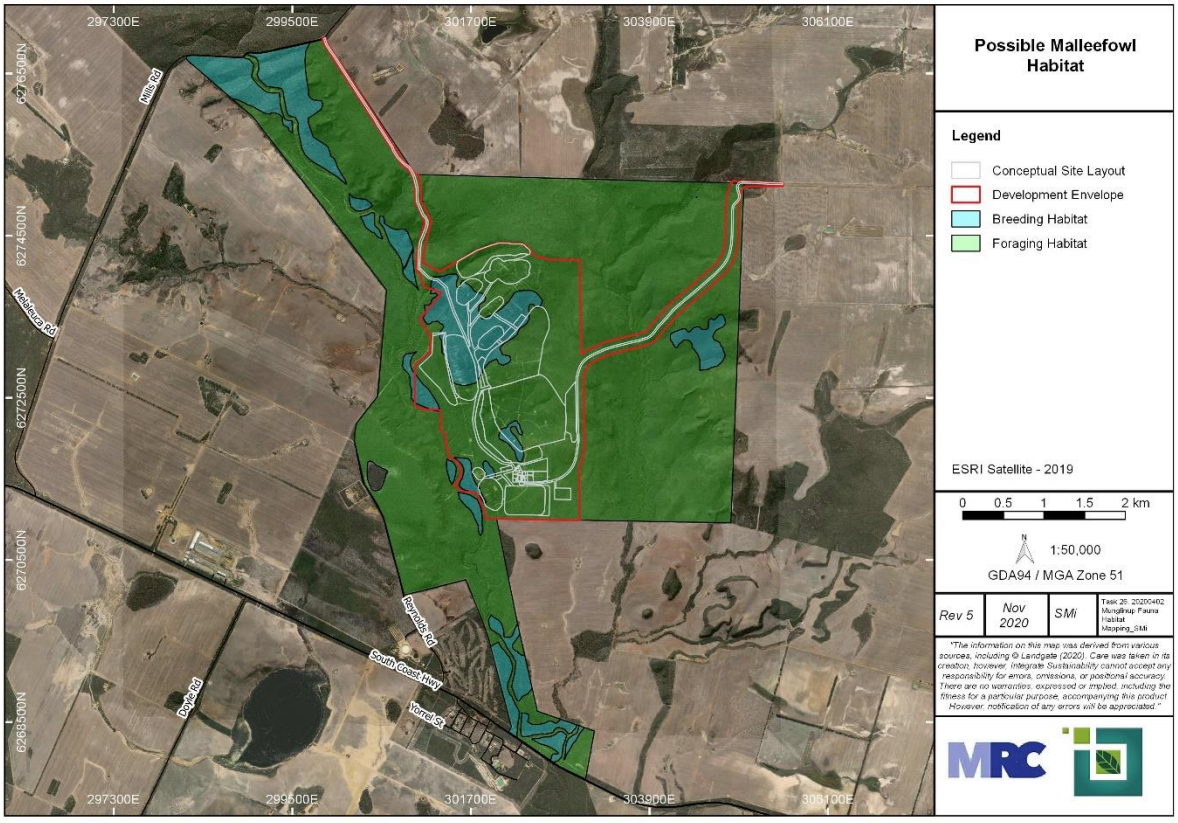


Figure 7-4 Possible Malleefowl Habitats

7.3.4 Chuditch

The Chuditch (*Dasyurus geoffroii*) is a carnivorous marsupial once abundant across nearly 70% of the continent (Department of Environment and Conservation, 2012). The Chuditch population and range has drastically declined and the species is now restricted to the south-west of Australia and is listed as Vulnerable (Department of Environment and Conservation, 2012). The Chuditch occurs in Jarrah forests and woodlands, mallee shrublands and heathlands where hollow logs or rocky outcrops are present and used as burrows (Department of Environment and Conservation, 2012).

A Level 2 Fauna Survey by Western Ecological in late 2019 found no Chuditch or their signs (scats and tracks) during the habitat assessments, noting the surveys were undertaken during the day and the Chuditch is primarily nocturnal (Western Ecological, 2020a). Chuditch have not been recorded within the development envelope in previous studies; however, Chuditch have been recorded within 30km of the Project with the most recent recording from 2001 (Figure 7-5) (Red Dog Environmental, 2018a). The local community are also aware of, and have seen, Chuditch in the region (Community Engagement Activities, 2018).

Table 7-5 Percent of Disturbance to Possible Chuditch Habitat

Habitat Type	Mapped Extent in Study Area Ha / %	Mapped Extent in Development Envelope Ha / %	Within Conceptual Site Layout Ha / %
Eucalyptus Woodland	288.6 / 9.5%	42.13 / 18.45%	9.16 / 4%

Chuditch are unlikely to use the area for breeding or denning as potential den sites were not recorded, with no observable suitably sized hollow logs, or hollows in trees or relatively large earth burrows. It is possible that Chuditch could be found within the Eucalyptus Woodland habitat type (Western Ecological, 2020a). The possible Chuditch habitat across the Study Area has been mapped in Figure 7-6 and equates to 228.60ha across the Study area and 42.13ha within the development envelope.

It is unlikely the Project would have a significant impact on the Chuditch populations in the region; this is based on the removal of 4% of the possible Chuditch foraging habitat within the Study Area (Table 7-5). There is a low potential that Chuditch movement along the Munglinup River Corridor may be temporarily impact through Project activities near the river. Most animals are likely to become a custom to the noise and recommence usage within a couple of years.

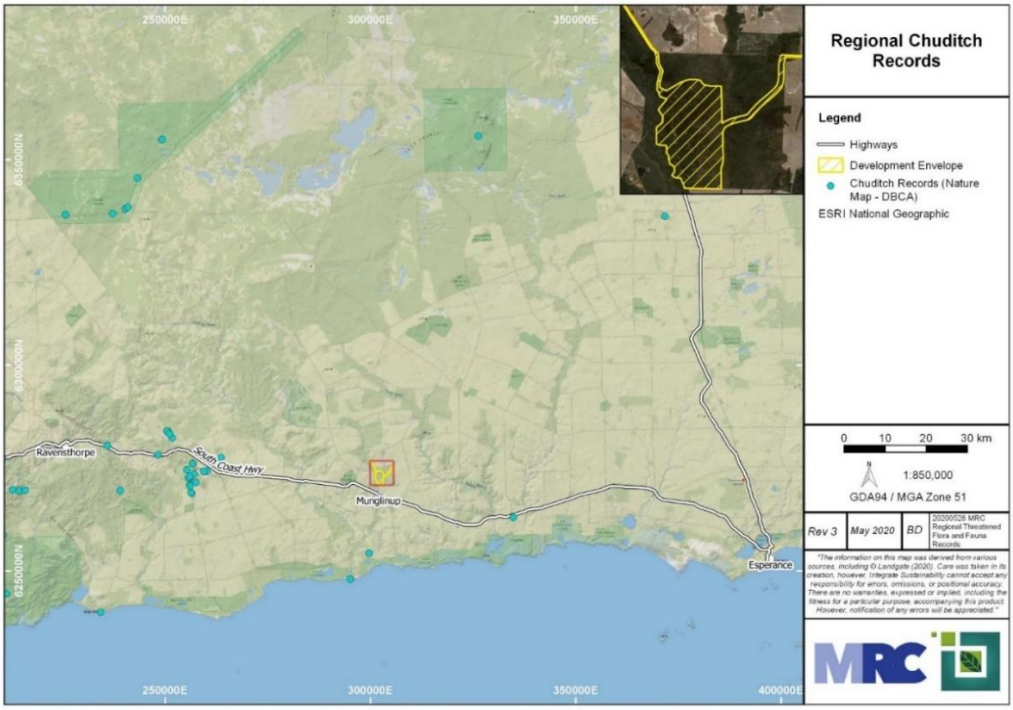


Figure 7-5 Regional Records of Chuditch

A full impact assessment identifying all potential impacts to threatened fauna and mitigation measures is provided in Section 5.4. Based on available information and this impact assessment, the Project has a relatively low indirect impact to Chuditch through the loss of possible habitat.

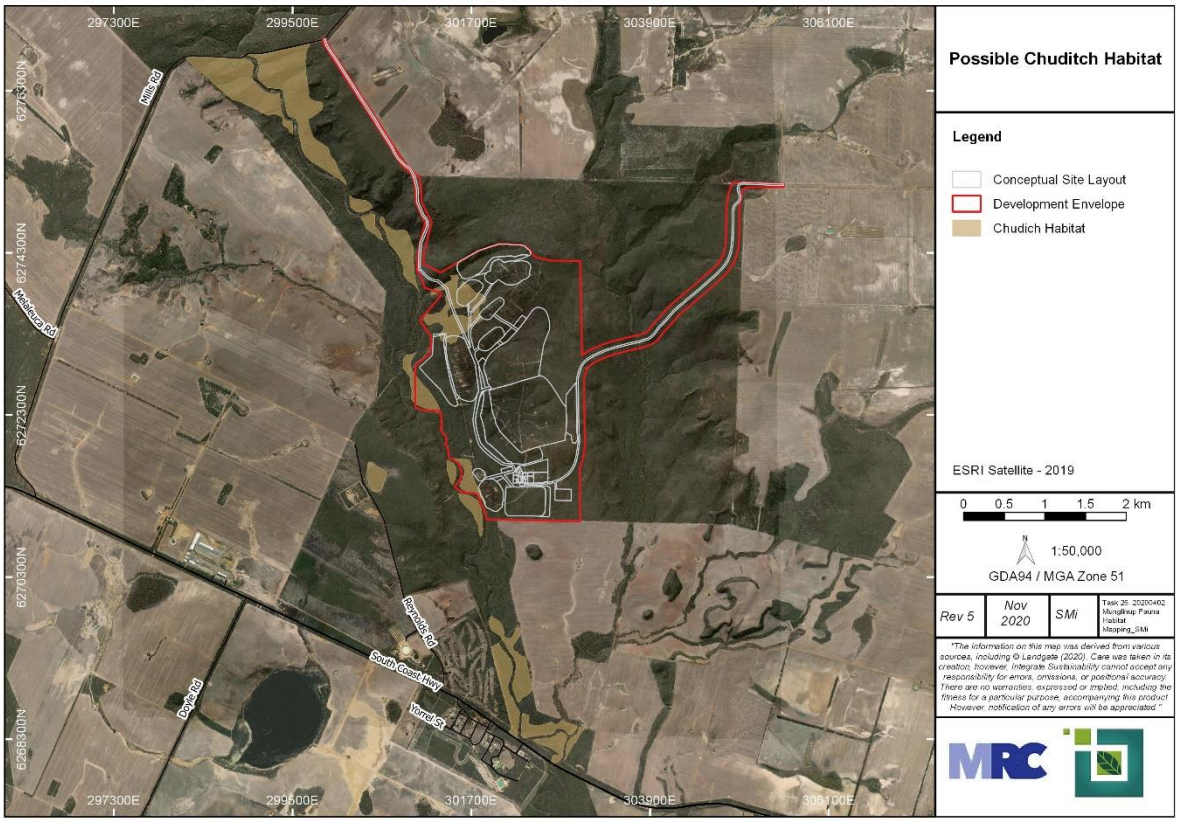


Figure 7-6 Possible Chuditch Habitat

7.3.5 Carnaby's & Baudin's Cockatoo

The Carnaby's Cockatoo (*Calyptorhynchus latirostris*) is a large black cockatoo endemic to the southwest of Western Australia, extending from the Murchison River to Esperance, and inland to Coroow, Kellerberrin and Lake Cronin. Populations have declined by well over 50% in the past 45 years due to large scale clearing for farming, resulting in the loss and fragmentation of habitat (Department of Environment and Heritage, 2014). This has included the significant loss of foraging and breeding habitat. In particular the loss of mature eucalypts and eucalypt woodlands such as jarrah, marri, salmon gum and wandoo that have suitable hollows for nesting (Department of Environment and Heritage, 2014).

Most breeding occurs in areas with an average annual rainfall of 300-750mm, typically in the Wheatbelt and Great Southern regions. The Carnaby's Cockatoo requires a close association between breeding and foraging sites for success during the breeding season, generally foraging within 6-12km of their nesting site (Department of Environment and Heritage, 2014). The loss of suitable foraging habitat, reduced food availability, competition and illegal shooting are also causing population decline. This species is listed as Endangered under the *EPBC Act*.

The Baudin's Cockatoo (*Calyptorhynchus baudinii*) is a large black cockatoo, similar to the Carnaby's Cockatoo but identifiable by an elongated upper mandible (Threatened Species Scientific Committee, 2018). This species is endemic to the southwest of Western Australia occurring within temperate forest and woodlands which range along the coast from Albany to Mundaring and inland as far as the Stirling Ranges (Threatened Species Scientific Committee, 2018).

The loss of suitable nesting hollows is the principal threat to the Baudin's Cockatoo, as well as habitat loss, reduced food availability, competition and illegal shooting related to population decline

(Threatened Species Scientific Committee, 2018). There were no Baudin's Cockatoos recorded during any of the field surveys at Munglinup. One record of this species exists within the Birdlife Australia database and is within 10km of the Project. Munglinup is on the edge of the known distribution of this species. While there is suitable foraging habitat present within the Project area, it is unlikely that this species is a regular visitor to the region (Red Dog Environmental, 2018a). There is also the possibility that the database record is a misidentification of a Carnaby's Cockatoo. The Project is not expected to have any impact to Baudin's Cockatoos.

Whilst no sighting of Black Cockatoos were made during any of the baseline surveys between 2014-2019 (Ecologia (2015), Red Dog (2018a) or Western Ecological (2020)), a search of the DBCA Threatened Species Database and the BirdLife Australia Database showed 65 Carnaby's Black Cockatoo records within 30km of the Project, with 38 of those records being within 12km (Figure 7-7). An opportunistic sighting of a flock of 30-40 Carnaby's Black Cockatoos was recorded during the week of June the 18th 2018 by ISPL staff with the cockatoos recorded landing in Eucalypt trees within the development envelope, before taking flight and heading north towards the Proteaceous Shrubland habitat.

The survey by Ecologia in 2014 determined no trees of suitable size or species for use by breeding Carnaby's Black Cockatoos were located within the survey area. In 2019, Western Ecological conducted a Level 2 Fauna survey in and surrounding the Project development area. During the regional habitat assessment, no Carnaby's Cockatoos were recorded at the habitat assessment sites and no foraging evidence in the form of chewed nuts or cones was recorded. However, Carnaby's Cockatoos were recorded in the regional area feeding on pine cones at two locations, *Banksia speciosa* (Showy Banksia) at one location; and they were observed ripping open branches of *Acacia* (it was assumed they were looking for larvae) (Western Ecological, 2020a).

While no habitat suitable for breeding was identified in the Project area, suitable foraging habitat does exist in the form of Proteaceae Dominated Shrubland (Woodman Environmental, 2020a). The Open mallee shrubland habitat in the area is the second most widespread habitat and much of it likely represents the *EPBC Act* listed TEC - Proteaceae Dominated Kwongkan shrublands of the Southeast Coastal Floristic Province of WA (Woodman Environmental, 2020a). This habitat is foraging habitat for Carnaby's Cockatoo as it includes *Eucalyptus pleurocarpa* many Proteaceous shrubs such as *Banksia sp., Hakea sp., Lambertia sp.* and other species that Carnaby's Cockatoos are known to forage on.

The Project will have no direct impacts on nesting or roosting areas, with none identified within the Project area. The closest roosting area is likely located 30km to the south, with the closest known breeding site located within the Cocanarup Timber Reserve near Ravensthorpe (over 80km to the west). Carnaby's Cockatoos are also likely to utilise pine trees for foraging and roosting on farm properties. The closest pine trees are over 12km from the Project area.

The Project will have a direct impact on Carnaby's Cockatoo foraging habitat (Figure 7-8). The majority of mapped Carnaby's Cockatoo habitat has been avoided and occurs outside of the development envelope. The potential foraging habitat within the development envelope has been made at 27.05ha. The Mallee Shrubland habitat where the Carnaby's were sighted opportunistically covers 491.3ha within the development envelope. Both habitat types also occur outside of the development envelope.

Where possible, all efforts will be made to ensure the disturbance footprint and site layout avoid and minimise disturbance to these foraging areas (1.35%). Proposed infrastructure areas are predominantly in the southern portion of M74/245 and will have no impact on the Proteaceous Shrubland habitat in the north but will remove portions of the Mallee Shrubland habitat.

Noise impacts from the mining operations may initially result in disturbance to the birds during foraging activities with the nearest open mining pit located 300m from the Proteaceous shrubland.

A full impact assessment identifying all potential impacts to fauna and threatened fauna and mitigation measures is provided in Section 5.4. Based on available information and this impact assessment, the Project is unlikely to cause a long-term decrease in the size of the Carnaby's Black

Cockatoo populations; however, the Project will have an impact on habitat available within the region for foraging. Overall, the Project will have a moderate-low on Carnaby's Cockatoo due to the direct loss of foraging habitat and the likely avoidance of the Project area by local flocks.

Table 7-6 Percent of Disturbance to Possible Carnaby's Cockatoo Habitat

Habitat Type	Mapped Extent in Study Area Ha / %	Mapped Extent in Development Envelope Ha / %	Mapped Extent in Conceptual Site Layout Ha / %
Open Mallee Shrubland	420.60 / 17.50%	27.05 / 6.43%	6.02 / 1.43%

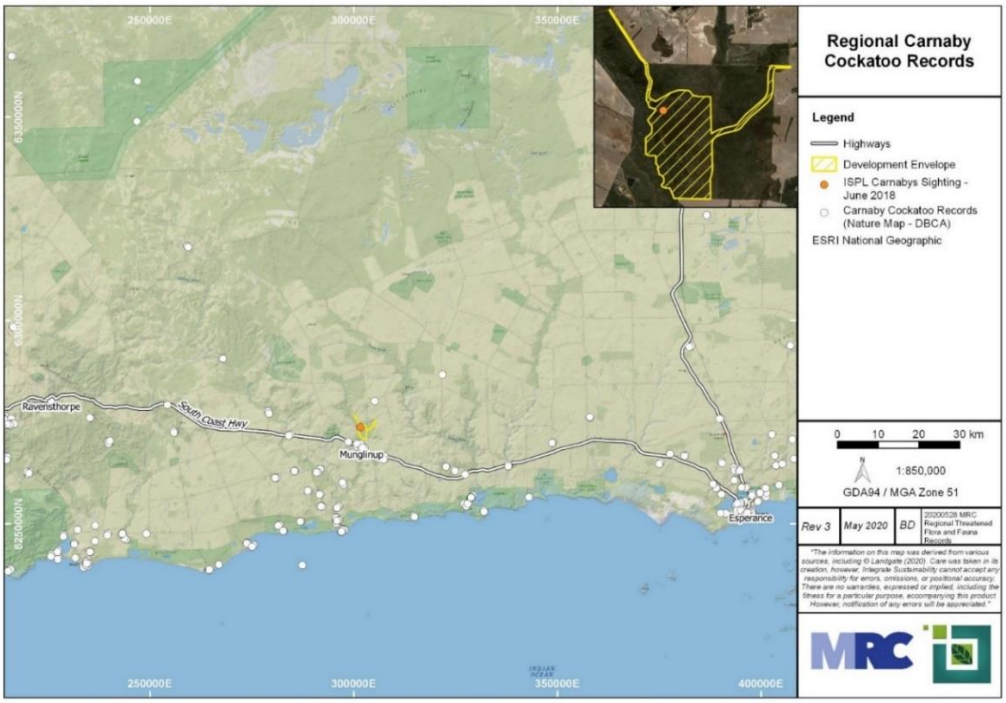


Figure 7-7 Regional Carnaby's Cockatoo Records

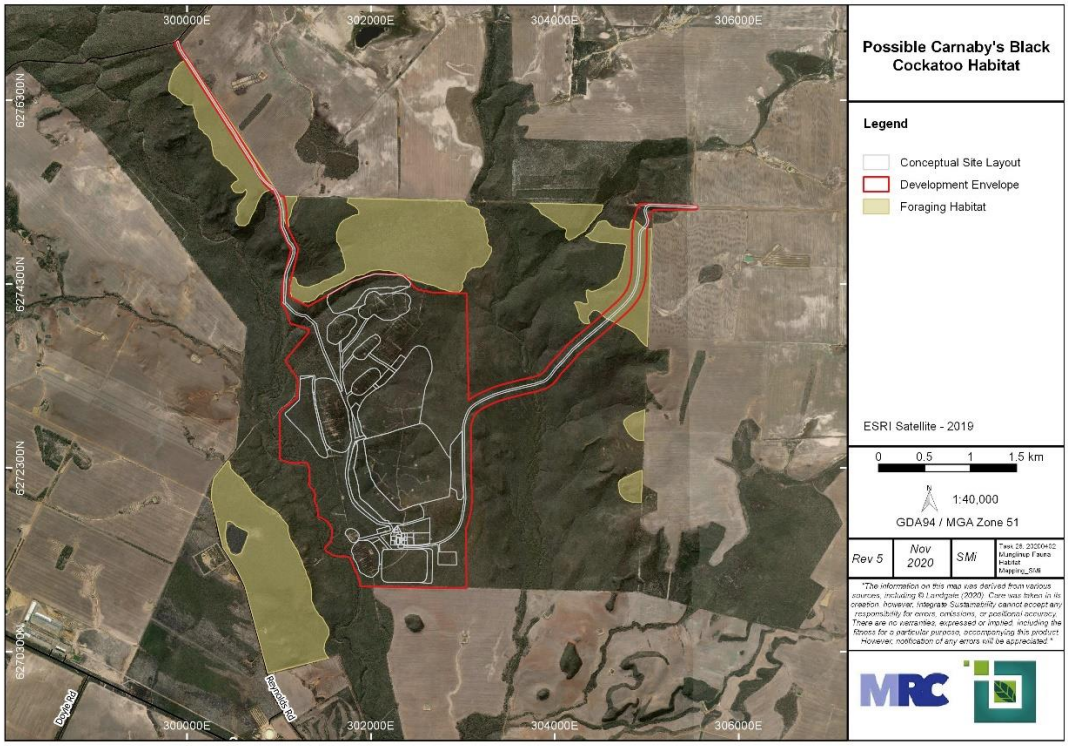


Figure 7-8 Possible Black Cockatoo Foraging Habitat (Western Ecological, 2020a)

7.3.6 Red-tailed Phascogale

The Red-tailed Phascogale (*Phascogale calura*) is a small, arboreal, carnivorous marsupial with a distinctive tail which grows up to 14.5 cm long. The portion nearer the body is reddish-brown while the other half comprises a brush of long black hairs. The Red-tailed Phascogale also has large, thin, reddish ears, ash-grey fur above and cream fur below its body. The Red-tailed Phascogale is largely confined to woodlands with old hollow producing Eucalypts, particularly Wandoo (*Eucalyptus wandoo*) and York gum (*E. loxophleba*). It is also often with associated rock sheoak (*Allocasuarina huegeliana*), but has also been recorded in shrublands and various mosaics of woodland, shrubland and scrub-heath (Short & Hide, 2012).

The Red-tailed Phascogale occurs in remnant vegetation in the southern wheatbelt of Western Australia and does not appear to extend into unfragmented habitat in either the Jarrah Forest to the west or the Mallee Bioregion to the east (Short & Hide, 2012). The Red-tailed Phascogale typically avoids relatively open areas and rocky ridges which are lacking vegetation (Bradley, 1997). The species prefers long unburnt (more than 50 years) patches of vegetation (Friend & Friend, 1993). Recorded nesting sites include hollow logs, tree hollows (Kitchener, 1981; Bradley, 1997) and the skirts and stumps of grass trees (*Xanthorrhoea spp.*).

A Level 2 Fauna Survey by Western Ecological in late 2019 observed no Red-tailed Phascogales or their signs (scats and tracks) while undertaking the regional habitat assessments, (noting that they were undertaken during the day and the Red-tailed Phascogale is nocturnal) (Western Ecological, 2020a). The Red-tailed Phascogale has not been recorded within the development envelope in previous studies.

The DBCA threatened fauna database has only one record within the 50km radial search, recorded near Jerdacuttup in 1997, approximately 35km to the west of the Project area (Figure 7-9). This record is considered an outlier record and on the eastern limits of the species' current distribution (Short & Hide, 2012).

The Project area has limited habitat considered suitable for denning - the Eucalyptus woodland habitat could be potentially suitable however no appropriately sized hollows were recorded. The likelihood of the Red-tailed Phascogale occurring in the project area is considered highly unlikely, due to this limitation in suitable habitat for denning, and the nearest record being 35km to the west of the Study Area.

Despite the lack of suitable habitat, a map of potential Red-tailed Phascogale habitat (Figure 7-10) has been divided into potential denning habitat and potential foraging habitat. Any potential for denning habitat in the Project area occurs within the Eucalyptus woodland. This habitat type has been mapped across 228ha within the study area (Table 7-7). Any potential for foraging habitat of the Red-tailed Phascogale occurs across all the other habitats combined.

A full impact assessment identifying all potential impacts to threatened fauna and mitigation measures is provided in Section 5.4. Based on available information and this impact assessment, the Project has a relatively low indirect impact to Red-tailed Phascogales through the loss of some suitable foraging and dispersal habitat.

Table 7-7 Percent of Disturbance to Possible Red-tailed Phascogale Habitat

Habitat Type	Mapped Extent in Study Area Ha / %	Mapped Extent in Development Envelope Ha / %	Mapped Extent in Conceptual Site Layout Ha / %
Eucalypt Woodland Habitat	228.6 / 9.5%	42.13 / 18.45%	9.16 / 4%

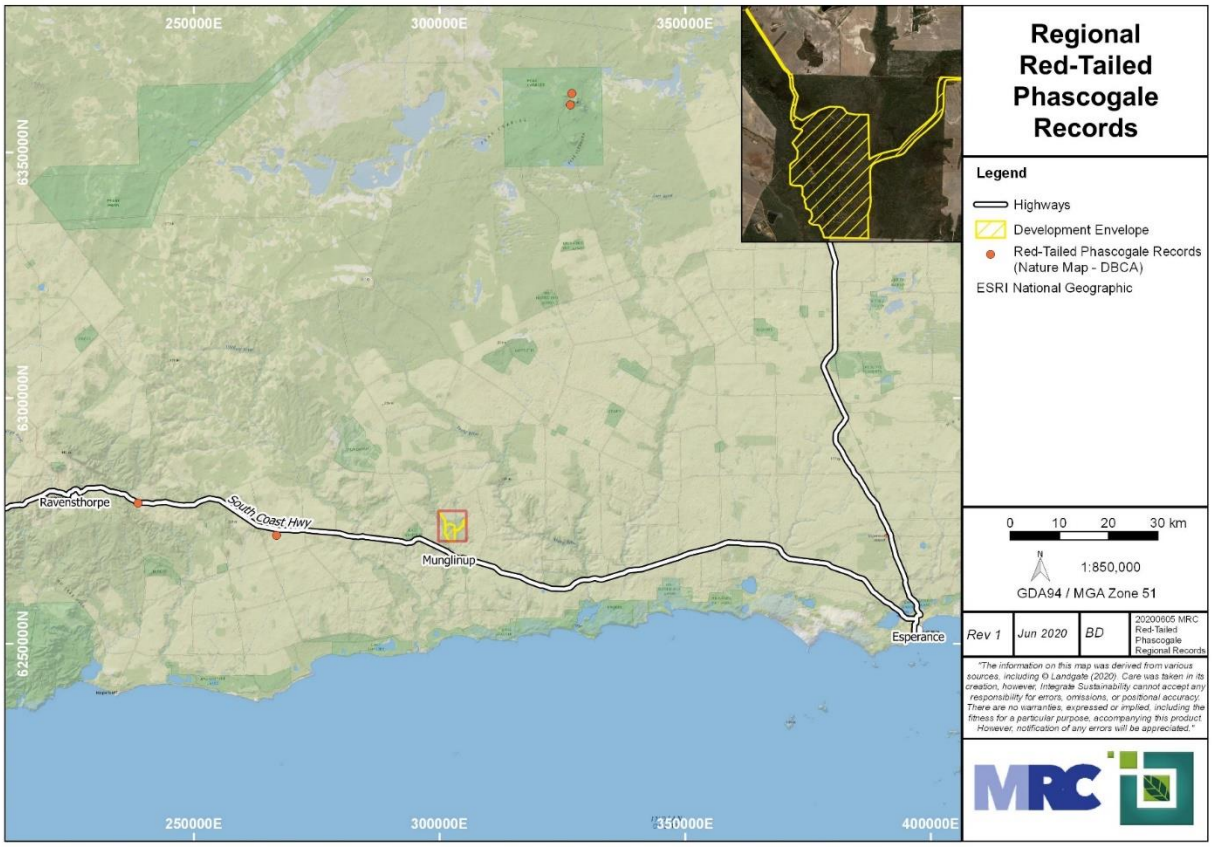


Figure 7-9 Regional Red-Tailed Phascogale Records

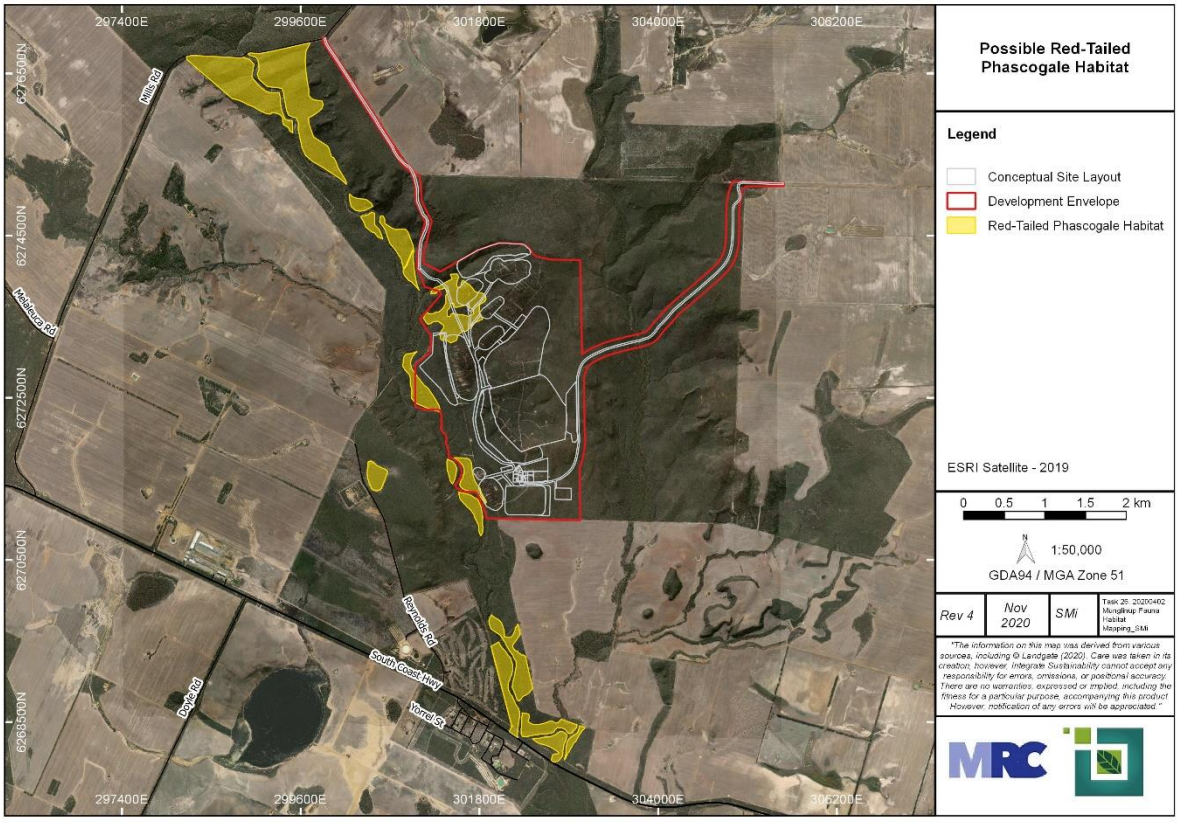


Figure 7-10 Possible Red-tailed Phascogale Habitats

7.4 Assessment of Potential Impacts to MNES

The potential impacts to the MNES have been described in Section 7.3. Additional information on the impacts have also been described within the EPA Environmental Factors for Flora and Vegetation (Section 5.2) and Terrestrial Fauna (Section 5.4).

In summary, potential impacts and threats to MNES from the proposed Project include:

- Loss of approximately 10ha (2.67%) of the Proteaceae Dominated Kwongkan Shrubland TEC (7.3.1).
- Loss of 9.16ha (4%) of possible breeding and 310.7ha (14.7%) of possible Malleefowl foraging habitat (this species was recorded in 2014 however no mounds or signs of usage have been recorded since then (7.3.3)).
- Loss of 9.16ha (4%) of possible Chuditch foraging habitat (this species may use the Project area but has not be confirmed as present (7.3.4)).
- Loss of 6.02ha (1.43%) of Open Mallee Shrubland used by Carnaby's Cockatoo for foraging.
- Loss of 9.16ha (4%) of possible Red-tailed Phascogale foraging habitat (this species may use the Project area but has not be confirmed as present) (7.3.6)
- Possible introduction of soil borne pathogens causing habitat decline particularly the Kwongkan Shrubland TEC (5.3.4).
- Possible introduction /spread of invasive plant species (weeds) causing vegetation health/habitat decline (5.3.4).
- Possible impacts to vegetation health from dust and changes in surface run-off associated with the operation (5.3.4).
- Disruption or disturbance to fauna from noise, vibration, light and dust emissions from the mining operation (5.4.4).

Overall, these impacts to MNES are not considered to be significant and are unlikely to influence populations of MNES within the region. It is acknowledged that there will be localised impacts to flora, vegetation and fauna communities, including MNES, but these are unlikely to result in the long-term decline of listed species and communities.

7.5 Mitigation Measure

Mitigation measure to address potential impacts on MNES area discussed in Section 5.3.5 for flora and vegetation and Section 5.4.5 relating to directly to fauna and fauna habitat impacts. In summary mitigation measures include:

- Implement industry standards and best-practice into the Project design and operation where possible.
- Avoid wherever possible, or minimise, clearing of the Kwongkan Shrubland TEC within the development envelope. In turn this will also avoid Black Cockatoo foraging habitat.
- Develop and implement an internal ground disturbance procedure to maintain a record of clearing activities, ensure pre-clearance checks are completed and ensure clearing is reduced to the absolute minimum required.
- Vehicle and equipment hygiene procedures will be implemented to minimise entry of weeds and soil borne diseases including *Phytophthora* Dieback.
- Develop of Project Management Plans which incorporate management and monitoring for impacts relating to MNES; and a specific management plan for *Phytophthora* Dieback.
- Maintain a database of conservation significant fauna sightings within the Project area.
- Provide an education program as part of the site induction for staff surrounding fauna found in the area including conservation significant fauna, recording fauna sightings and reporting injured fauna.
- Provide an education program as part of the site induction for staff surrounding the identification of the Kwongkan Shrubland TEC and other MNES.
- Undertake rehabilitation activities that will promote the rehabilitation of fauna habitat.

- Complete an additional flora and vegetation survey to determine the extent of listed flora species habitat and occurrence within the Project area.

With the above mitigation measures in place, MRC Graphite are confident impacts to MNES can be managed appropriately.

7.6 Recovery Plans, and Threat Abatement Plans Alignment

Recovery and Threat Abatement Plans relevant to the MNES associated with the Project are listed in Table 7-8. A discussion of how the Project conforms to the Plan requirements is included.

Table 7-8 Recovery Plans and Threat Abatement Plans for MNES

Plan/Conservation Advice	MRC Proposal
National Recovery Plan for Malleefowl (*Leipoa ocellata)* **(Department of Environmental Heritage, 2007)**	*Known and Potential Threats 1 – Clearing* The proposal may exacerbate this threat however the Proposal is designed to maximise use of existing disturbed areas to minimize the loss of known area occupied or mapped by potential Malleefowl habitat. • Up to 295ha of native vegetation will be removed for the proposal for the site layout footprint which has been assessed as being possible Malleefowl breeding and foraging habitat. • 2,124.5ha of Malleefowl habitat is known to occur within the survey area. • Clearing controls (internal) will be implemented to prevent accidental clearing of possible Malleefowl habitat.
	Known and Potential Threats 2 – Fragmentation and Isolation The Proposal may exacerbate this threat. • There has been a single opportunistic sighting of a Malleefowl moving through the Eucalypt Woodland (Ecologica Environment, 2015). • Malleefowl may visit the Project area for foraging but are unlikely to be capable of moving through these dense regrowth areas and are likely to prefer the unburnt patches. • Clearing of habitat considered possible suitable for Malleefowl will be limited to 319.86ha and will not cause complete fragmentation or isolation.
	Known and Potential Threats 3 – Grazing This proposal will not exacerbate this threat: • This area is not used for grazing of livestock • There are no artificial water sources in the area.
	Known and Potential Threats 4 – Predation The Proposal is unlikely to exacerbate this threat. • Domestic animals are not allowed to be brought onto the Mine. • Pest animal control program will be undertaken on site in cooperation with regional control programs where appropriate. • Staff training and awareness programs will provide information on feral species and the required management practices
	Known and Potential Threats 5 – Fire (wildfire and intentional burns) The Proposal is unlikely expected to exacerbate this threat. • There is a low risk of accidental fire as a result of mining activities. • Clearing activities pose the greatest risk of fire generation. To minimise the risk of fire clearing activities will not be undertaken when the Fire Danger Rating it severe or higher. • Regular maintenance will occur on fire breaks and the Project will implement fire management procedures (e.g. Hot Work Permit system, firefighting training, Emergency Response Plan) to avoid increases in fire frequency. • Firefighting equipment will be on site and in all vehicles.

Plan/Conservation Advice	MRC Proposal
	• The Project will work with DFES and DBCA to undertake prescribed burns if deemed necessary.
	Known and Potential Threats 6 – Mortality on Roads The Proposal will not exacerbate this threat. • Vehicle speeds will be reduced on internal roads and off-road driving will be prohibited unless authorised for a specific purpose (i.e. exploration, biological surveys or monitoring). This will be conveyed to staff via the induction process. • All fauna strikes will be reported and investigated.
Chuditch (*Dasyurus geoffroii*) Recovery Plan. Wildlife Management Program No. 54. Department of Environment and Conservation, Perth, Western Australia. **(Department of Environment and Conservation, 2012)**	*Known and Potential Threats 1 – Land Clearing and Habitat Alteration* The Proposal may exacerbate this threat however the Proposal is designed to minimize loss of suitable habitat. • Up to 9.16ha of possible Chuditch habitat will be removed from the site layout footprint for the proposal. • 288.6ha of Chuditch habitat is known to occur within the Survey Area. • The presence of Chuditch has not been confirmed during any of the baseline studies.
	Known and Potential Threats 2 – Predation by, and competition from, introduced foxes and cats The Proposal is unlikely to exacerbate this threat. • Pest animal control program will be undertaken on site in cooperation with regional control programs where appropriate. • Staff training and awareness programs will provide information on feral species and the required management practices
	Known and Potential Threats 3 – Deliberate and accidental death The Proposal is not considered to exacerbate this threat: • All efforts are made to ensure the protection of native fauna within the Development Envelope. • Staff and contractors are educated on the native fauna values present within the Development Envelope during the site Environmental Induction. • Domestic animals (including dogs and cats) are not allowed on the site. • Firearms are not permitted on site (unless with Registered Manager approval). • Native fauna injuries and deaths are required to be reported as an incident and investigated. • The speed of vehicles is restricted on site and along access roads to reduce the likelihood of native fauna fatality as a result of vehicle strike. Off-road driving is not permitted unless for an exempt purpose (monitoring or exploration).
Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. **(Department of Parks and Wildlife, 2013)**	*Known and Potential Threats 1: Loss of Breeding habitat* The Proposal will not exacerbate this threat: • There will be no loss of breeding habitat to the Carnaby's Cockatoo.
	Known and Potential Threats 2: Loss of Non-breeding, Foraging and Night roosting Habitat The Proposal may exacerbate this threat however the Proposal is designed to minimize loss of non-breeding, foraging and night roosting habitat: • It is envisaged that 6.02ha of Carnaby's Cockatoo habitat will be removed within the site layout footprint. This habitat consists of habitat described in the recovery plan as critical to the survival of black cockatoos. • 420.60ha of Carnaby Cockatoo habitat is known to occur within the survey area.

Plan/Conservation Advice	MRC Proposal
	Known and Potential Threats 3: Tree Health The Proposal is unlikely to exacerbate this threat as dieback is not known to occur within the development area. Mitigation measures are proposed to reduce this risk. • Dieback surveys will be undertaken prior to undertaking disturbance in areas not previously surveyed and updated surveys are conducted every three years by a Dieback Interpreter. • The Dieback management plan will be implemented. • All workers, contractors and subcontractors will be inducted about the risks of Dieback spread.
	Known and Potential Threats 4: Mining and Extraction Activities The Proposal is set to remove up to 5.75ha of foraging habitat, therefore the Proposal may exacerbate this threat: • Progressive rehabilitation will be undertaken in accordance with the Mine Closure Plan. This will, over time return some of the foraging habitat lost as a result of native vegetation clearing for the mine development.
	Known and Potential Threats 5: Illegal Shooting The Proposal will not exacerbate this threat: • No firearms will be allowed on site (unless with Registered Manager approval).
	Known and Potential Threats 6: Illegal Taking The Proposal will not exacerbate this threat: • Only feral animal traps deployed by dedicated environmental employees/contractors are allowed on site. • Interference with native fauna is not allowed and staff will be educated not to interfere with native wildlife during the site induction. • MRCG will implement its Terrestrial Fauna Management Plan.
	Known and Potential Threats 7: Climate Change The proposal is not expected to exacerbate this threat.
	Known and Potential Threats 8: Collisions with Motor Vehicles The Proposal will not exacerbate this threat. • Vehicle speeds will be reduced on internal roads and off-road driving will be prohibited unless authorised for a specific purpose (i.e. exploration, biological surveys or monitoring). This will be conveyed to staff via the induction process. • All fauna strikes will be reported and investigated.
	Known and Potential Threats 9: Disease (Biological Threats) The Proposal will not exacerbate this threat: • No domestic animals (i.e. dogs) are allowed to be brought into the Development Envelope.
Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi*. Canberra, ACT. **(Department of the Environment, 2014)**	*Objective 1: Identify and prioritise for protection biodiversity assets that are, or may be, impacted by Phytophthora cinnamomic* The Proposal is considered consistent with this objective: • Flora, fauna and ecological communities at risk of dieback caused *by P. cinnamomi* have been prioritised in terms of preventing further spread of dieback to the areas within and surrounding the Development Envelope through implementation the MRC Dieback Management Plan.
	Objective 2: Protect priority biodiversity assets through reducing the spread and mitigating the impacts of Phytophthora cinnamomic The Proposal is considered consistent with this objective: • The MRC Dieback Management Plan will be implemented for all activities
	Objective 3. Communication and training The Proposal is considered consistent with this objective. • All staff and contractors are informed of hygiene requirements through the site induction.

Plan/Conservation Advice	MRC Proposal
	• Greencard training is undertaken for supervisors working in areas at risk of spread or introduction of dieback.

7.7 Predicted Outcome

The possible outcomes for the MNES impacted by the Project are:

Kwongkan Shrubland TEC

- No accidental or unlawful clearing of the Kwongkan Shrubland TEC.
- Clearing of 2.67% of the Kwongkan Shrubland TEC within the Study Area. This clearing is unlikely to change the Status of the TEC.

By implementing the measures listed above it is predicted there will be minimal impact to the Kwongkan Shrubland TEC. The primary impact is related to clearing, indirect impacts could be introduction of weeds or *Phytophthora* Dieback.

Flora

- No accidental or unlawful clearing of *C. lepidospermoides or Rhizanthella johnsonii* habitat or individual specimens.

By implementing the measures outline above and in the attached management plan, MRC Graphite predicts there will be minimal impacts to other listed flora species.

Fauna

- No mortality of threatened fauna species from clearing activities associated with the Project. MNES species observed within development envelope include Carnaby's Cockatoo and Malleefowl.
- Clearing of 4% of possible Malleefowl breeding habitat within the development envelop, however the habitat is also located outside of the development envelope.
- Clearing of possible foraging habitat associated with Malleefowl (14.7%), Chuditch (4%), Carnaby's Cockatoo (1.43%) and Red-tailed Phascogales (4%).
- No detrimental impact on habitat of threatened fauna species outside of proposed clearing areas as a result of weed or disease spread to adjacent areas, sedimentation from runoff, reduced availability or quality of surface or groundwater, or accidental clearing beyond approved areas which is associated with the implementation of the Project.

By implementing the measures outline above, MRC Graphite predicts there will be minimal impacts to fauna species list as MNES.

8 Offsets

Under both the WA Environmental Offsets Policy (2011) and the Australian Government's EPBC Act Offsets Policy (2012), environmental offsets are required where a project is likely to cause significant residual impacts. Residual impacts are unavoidable impacts that remain after avoidance, minimisation and rehabilitation have been pursued. Environmental offsets counterbalance the significant residual environmental impacts of a project (Government of Western Australia, 2011).

Offsets differ to mitigation measures in that they are undertaken outside of development envelope (Government of Western Australia, 2014). An offset can be direct (for example, rehabilitation of areas outside of the project to enhance biodiversity values) or indirect (such as a research programme into a critical environmental asset).

The Western Australia Government Offset Policy (2011) identifies the principles on which decisions about offsets might be made:

- Offsets are only considered after avoidance and mitigation options have been pursued.
- Offsets are not appropriate for all Project and will not be applied to minor impacts.
- Where offsets are appropriate, they should be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.
- Offsets will be based on sound environmental information and knowledge.
- Offsets should be adaptable where there is uncertainty.
- Offsets should focus on longer term strategic outcomes.

Like the WA Offset Policy, the EPBC Act environmental offsets policy (Australian Goverment, 2012) seeks to ensure offsets associated with MNES:

1. deliver an overall conservation outcome that improves or maintains the viability the values protected by EPBC Act and affected by the proposed action.
2. are built around direct offsets but may include other compensatory measures.
3. are in proportion to the level of statutory protection that applies to the protected matter.
4. are of a size and scale proportionate to the residual impacts on the protected matter.
5. effectively account for and manage the risks of the offset not succeeding.
6. be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs this does not preclude recognition of state offsets.
7. be efficient, effective, timely, transparent, scientifically robust, and reasonable.
8. have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

The information presented below (Table 8-1, Table 8-2 and Table 8-3) has been compiled to inform the assessment of offsets required for the Project.

Table 8-1 Consideration of WA Offset Principles

WA Offset Principles	Consideration
1. Environmental offsets will only be considered after avoidance and mitigation options have been pursued.	Avoidance, minimise and rehabilitation of impacts to flora, vegetation, Terrestrial fauna and MNES have been described within section 5.3, 5.4, 6.1, 6.2 and 7.3 of this document.
2. Environmental offsets are not appropriate for all projects.	Through the application of the mitigation hierarchy, it is shown that most of the Proposal's impacts would be mitigated and rehabilitated, so as not to leave any significant permanent impact. While MRC believes most impacts can be prevented or mitigated, an offset may be need for Significant values related to the Proteaceae Dominated Kwongkan Shrublands TEC, Chuditch or Malleefowl.

WA Offset Principles	Consideration
3. Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.	Principle consider when determine if an offset is required.
4. Environmental offsets will be based on sound environmental information and knowledge.	Investigations undertaken for the Project have been completed by competent persons in accordance with relevant guidance and standards. This information has formed the basis of this environmental impact assessment, including the application of mitigation and management measures and the assessment of significance of residual impact.
5. Environmental offsets will be applied within a framework of adaptive management.	Principle consider when determine if an offset is required.
6. Environmental offsets will be focussed on longer term strategic outcomes	Principle consider when determine if an offset is required.

8.1 Significant Residual Impact

Table 8-2 and Table 8-3 provide a summary of residual impacts associated with the Proposed Munglinup Graphite based on the residual impact significance model, while WA offset template. In comparison with the principles outline in the Offset Guideline the Project:

- Will not result in the removal of any Threatened Flora Species listed under the EPBC Act or BC Act. Were practical the Project has been designed to minimise impacts to 6 Priority Flora species and 3 Noval species recorded in the development envelope and would not result in in any species being reclassified as Threatened under the BC Act or EPBC Act.
- Has been designed to minimise impacts to Proteaceae Dominated Kwongkan Shrublands list as Endangered under the EPBC Act and Priority 3 community in WA. Clearing has been designed to ensure only 2.67% of the Kwongkan community mapped within the Study will be directly impacted (disturbance footprint) with a possibility that 8.82% could be indirectly impacted (development envelope).
- Will not result in impacts to the landscapes where existing vegetation is required to maintain ecosystem services. Four pre-European vegetation units are present within the Study area two communities will be cleared by the Project the clearing is less than 1% for both communities (Esperance 47 and Esperance 516).
- Will not impact on any conservation reserves, there could have an impact on the ecological linkage values of the Munglinup River Corridor as the modelled values for the corridor could be reduced by 10%. This impact is not envisaged to affect the use of the corridor by Threatened species such as but not limited to Chuditch or Malleefowl.
- Will not result in impacts to communities or species that are representative of high biodiversity, have a higher diversity than other examples of an ecological community in a bioregion, or which is in “degraded” condition yet is in a better condition than other vegetation of the same community in the local area.
- Will not result in impacts that contribute to a terrestrial fauna species being listed as specially protected under the BC Act or listed as threatened under the EPBC Act or where impact affects significant habitat for the species.
- Will result in the removal of 4% of possible Malleefowl breeding and 14.7% of possible Malleefowl foraging habitat. However, no Malleefowl mound will be removed as none have been recorded.
- Will remove 1.35% of mapped Carnaby’s Cockatoo foraging habitat and may indirectly impact 6.43% of mapped Carnaby’s Cockatoo foraging habitat.
- Will remove 4% of possible Chuditch and Red-tailed Phascogale foraging habitat within the Study area.

Appendix I is the MNES Offset Supporting Document.

Table 8-2 Residual Impact Significance Model Assessment

Environmental Factor – Flora and Vegetation							
Principles	**Threatened Flora**	**Threatened Ecological Communities**	**Remnant Vegetation**	**Wetlands and Waterways**	**Conservation Areas**	**High Biological Diversity**	**Matters of National Environmental Significance**
Residual impact that is environmentally unacceptable and cannot be offset	No residual impacts are considered to meet this criteria						
Significant residual impacts that will require an offset	No residual impacts are considered to meet this criteria						
Significant residual impacts that may require an offset	No species classified as Threatened under the EPBC Act or BC Act will be cleared.	Direct impact of approximately 10ha of the 33ha of the Kwongkan Shrublands TEC in the development envelope	No residual impacts are considered to meet this criteria – less than 1% of the pre-European vegetation associations with the development envelope will be cleared by the Project	No residual impacts are considered to meet this criteria: • There are no Conservation Category Wetlands within or surrounding the Development Envelope. • No phreatophytic flora taxa or groundwater dependent vegetation have been identified as occurring naturally in the Development Envelope	No residual impacts are considered to meet this criteria - no formal conservation reserves or areas under conservation covenant within the Development Envelope. The closest reserves for conservation are East Naernup Nature Reserve and Munglinup Nature Reserve	No residual impacts are considered to meet this criteria – no vegetation communities are consider high biodiversity areas.	Direct impact of approximately 10ha of the 33ha of the Kwongkan Shrublands TEC in the development envelope or <0.01% of the regional Kwongkan Shrubland TEC of 1,185,188ha.
Residual impacts that are not significant	No species classified as Threatened under the EPBC Act or BC Act will be cleared. The Project will remove occurrences of 3 priority flora species. *Commersonia rotundifolia* - 35 individuals of *Commersonia rotundifolia* (P3) have been previously recorded within the study area (in 2015) but were not located in 2019 (likely due to fire history). No plants are located within the Disturbance Footprint. This species is deemed not significantly impacted by the Project. *Pultenaea calycina* subsp. *proxena* - Up to 1406 individuals of *Pultenaea calycina* subsp. *proxena* (P4) were recorded within the Study area 577 plants area located within the Disturbance footprint. The scale of local potential impact is Moderate due to the 41% of the recorded plants being found within the Disturbance Footprint	Locally important Vegetation - Vegetation units 5, 7, 11 and 15 have been identified, 22.54% of UV5, 63.01% of UV7, 21.4% of UV11 and 48.54% of UV15 are located within the Disturbance Footprint. UV7, UV11 and UV15 are all located within Reserve area adjcant to Project Area.	Three of the mapped Beard's vegetation system associations occur within the development envelope. These have been assessed using the CAR system and have the following % remaining of native vegetation: • Vegetation unit 516: 31.41% remaining, • Vegetation unit 47: 14.82% remaining • Vegetation unit 931: 40.19% remaining	No residual impacts are considered to meet this criteria - • There are no Conservation Category Wetlands within or surrounding the Development Envelope. • No phreatophytic flora taxa or groundwater dependent vegetation have been identified as occurring naturally in the Development Envelope	No residual impacts are considered to meet this criteria - no formal conservation reserves or areas under conservation covenant within the Development Envelope. The closest reserves for conservation are East Naernup Nature Reserve and Munglinup Nature Reserve	No residual impacts are considered to meet this criteria – no vegetation communities are consider high biodiversity areas.	No flora species listed under EPBC Act will be cleared during the project implementation.

Environmental Factor – Flora and Vegetation							
Principles	**Threatened Flora**	**Threatened Ecological Communities**	**Remnant Vegetation**	**Wetlands and Waterways**	**Conservation Areas**	**High Biological Diversity**	**Matters of National Environmental Significance**
	The regional significance of impact is ranked Low, due to the relatively large number of known populations and the location of the Study Area being within the known range of this taxon. As such the impact is deemed not significant. *Stachystemon vinosus* - Up to 70 individuals of *Stachystemon vinosus* (P4) are within the Disturbance Footprint from two populations. An Additional three populations are located outside of the Development Envelope. Given the significance of local populations in the regional context, this species is deemed as not significantly impacted by the Project.						

Environmental Factor – Terrestrial Fauna					
Principles	**Wetlands and Waterways**	**Conservation Areas**	**High Biological Diversity**	**Habitat for Fauna**	**Matters of National Environmental Significance**
Residual impact that is environmentally unacceptable and cannot be offset	No residual impacts are considered to meet this criteria				
Significant residual impacts that will require an offset	No residual impacts are considered to meet this criteria				
Significant residual impacts that may require and offset	No residual impacts are considered to meet this criteria - There are no Conservation Category Wetlands within or surrounding the Development Envelope.	No residual impacts are considered to meet this criteria - no formal conservation reserves or areas under conservation covenant within the Development Envelope. The closest reserves for conservation are East Naernup Nature Reserve and Munglinup Nature Reserve	No residual impacts are considered to meet this criteria – no fauna habitats are consider high biodiversity areas.	Direct impact to 4% of possible Malleefowl breeding habitat and 14.7% of possible Malleefowl foraging habitat. Malleefowl are either absent from the study area or in low densities that make them difficult to detect as no Malleefowl or their mounds were recorded during the last survey in 2019. The habitat in the study area is likely suboptimal	Direct impact to 9.16ha (4%) of possible Malleefowl breeding habitat and 311ha (14.7%) of possible Malleefowl foraging habitat. Malleefowl are either absent from the study area or in low densities that make them difficult to detect as no Malleefowl or their mounds were recorded during the last survey in 2019. The habitat in the study area is likely suboptimal
Residual impacts that are not significant	No residual impacts are considered to meet this criteria - There are no Conservation Category Wetlands within or surrounding the Development Envelope.	No residual impacts are considered to meet this criteria - no formal conservation reserves or areas under conservation covenant within the Development Envelope. The closest reserves for conservation are East Naernup Nature Reserve and Munglinup Nature Reserve	No residual impacts are considered to meet this criteria – no fauna habitats are consider high biodiversity areas.	• No Carnaby Cockatoo breeding habitat was noted within the study areas. • Approximately 5.72ha (1.35%) of Carnaby Cockatoo Foraging Habitat within the Study Area will be removed. • Approximately 9.16ha (4%) of possible Chuditch and Red-tailed Phascigale foraging habitat will be removed from the Study Area	• No Carnaby Cockatoo breeding habitat was noted within the study areas. • Approximately 6.02ha (1.43%) of mapped Carnaby Cockatoo Foraging Habitat within the Study will be removed. • No Chuditch dens were observed within the Study Area • Approximately 9.16ha (4%) of possible Chuditch foraging habitat will be removed from the Study Area

Environmental Factor – Ecological Linkages							
Principles	**Threatened Flora**	**Threatened Ecological Communities**	**Remnant Vegetation**	**Wetlands and Waterways**	**Conservation Areas**	**High Biological Diversity**	**Habitat for fauna**
Residual impact that is environmentally unacceptable and cannot be offset	No residual impacts are considered to meet this criteria						
Significant residual impacts that will require an offset	No residual impacts are considered to meet this criteria						
Significant residual impacts that may require and offset	No residual impacts are considered to meet this criteria						
Residual impacts that are not significant	No residual impacts are considered to meet this criteria - Increased fragmentation and narrowing of vegetation along the Munglinup River Corridor reducing the modelled values for the overall Munglinup Linkage by 10%.		No residual impacts are considered to meet this criteria - Increased fragmentation and narrowing of vegetation along the Munglinup River Corridor reducing the modelled values for the overall Munglinup Linkage by 10%.	No residual impacts are considered to meet this criteria – no fauna habitats are consider high biodiversity areas.	No residual impacts are considered to meet this criteria - no formal conservation reserves or areas under conservation covenant within the Development Envelope. It is acknowledge that the Munglinup River Corridor provides a linkage from the Great Western Woodlands in the North and nature reserves along the coast	No residual impacts are considered to meet this criteria.	No residual impacts are considered to meet this criteria - Increased fragmentation and narrowing of vegetation along the Munglinup River Corridor reducing the modelled values for the overall Munglinup Linkage by 10%

Table 8-3 WA Offset Template

Existing environment/ Impact	*Mitigation*			*Significant Residual Impact*	*Offset Calculation Methodology*				
	Avoid and minimise	*Rehabilitation Type*	*Likely Rehab Success*		*Type*	*Risk*	*Likely offset success*	*Time Lag*	*Offset Quantification*
Clearing of Native Vegetation									
Clearing of up to 350ha of native vegetation	Minimise: The cleared area will make use of historic clearing. Clearing will occur in stages and temporary activities will be positioned within the footprint of permanent clearing areas	Rehabilitation will occur progressively across the site. All disturbance other than the open pits will be rehabilitated. Consideration will be given to backpilling mining voids over the life of the Project.	<u>Can the environmental values be rehabilitated/Evidence?</u> Based on the natural rehabilitation that has occurred onsite it is expected that rehabilitation will be effective. <u>Operator experience in undertaking rehabilitation?</u> MRC Graphite parent company and staff have experience in undertaking rehabilitation activities in WA and overseas. <u>What is the type of vegetation being rehabilitated?</u> The plan for the Project is to return vegetation that is comparable to the pre-clearing communities	<u>Quality</u> The majority of the Study area is considered in Pristine or excellent condition. It is considered likely that rehabilitation will successfully achieve a vegetation condition comparable to predisturbance. <u>Conservation Significance</u> Up to 2.67% of the Kwongkan Shrublands TEC will be impacted b the disturbance footprint. All of the cleared TEC will be rehabilitated <u>Land Tenure</u> The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure <u>Time Scale</u> Rehabilitation will be undertaken progressively over the life of the Project Residual impact not considered to be significant because - clearing will not result in a significant area of disturbance to the Kwongkan Shrublands TEC and the majority of the disturbance will be rehabilitated.	N/A	N/A	N/A	N/A	N/A
Loss of Threatened Flora species	Avoid: The Project has been designed to avoid the clearing of *Conostylis lepidospermoides* (T) and vegetation where *Rhizanthella johnsonii* (T) may occur (not confirmed)	Future development of the Mine Closure Plan will investigate suitability of re-establishing vegetation known to be associated with *Conostylis lepidospermoides* (T) and *Rhizanthella johnsonii* (T) in the revegetation programs.	<u>Can the environmental values be rehabilitated/Evidence?</u> Based on the natural rehabilitation that has occurred onsite it is expected that rehabilitation will be effective. <u>Operator experience in undertaking rehabilitation?</u> MRC Graphite parent company and staff have experience in undertaking rehabilitation activities in WA and overseas. <u>What is the type of vegetation being rehabilitated?</u> The plan for the Project is to return vegetation that is comparable to the pre-clearing communities	<u>Quality</u> The majority of the Study area is considered in Pristine or excellent condition. It is considered likely that rehabilitation will successfully achieve a vegetation condition comparable to predisturbance. <u>Conservation Significance</u> No threatened species are proposted to be cleared. <u>Land Tenure</u> The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure <u>Time Scale</u> Rehabilitation will be undertaken progressively over the life of the Project No residual impact predicted.	N/A	N/A	N/A	N/A	N/A

Existing environment/ Impact	*Mitigation*			*Significant Residual Impact*	*Offset Calculation Methodology*				
	Avoid and minimise	*Rehabilitation Type*	*Likely Rehab Success*		*Type*	*Risk*	*Likely offset success*	*Time Lag*	*Offset Quantification*
Loss of Priority and Novel Flora Species	Avoid: Two priority flora species are not located within the development envelope and one is within the development envelope but outside the disturbance footprint. Minimise: Two priority flora species and two Novel species occur within the disturbance footprint, efforts will be made to minimise the remove of plants during the implementation of the Project	Future development of the Mine Closure Plan will investigate suitability of using Priority and Novel flora species in revegetation programs.	<u>Can the environmental values be rehabilitated/Evidence?</u> Based on the natural rehabilitation that has occurred onsite it is expected that rehabilitation will be effective. <u>Operator experience in undertaking rehabilitation?</u> MRC Graphite parent company and staff have experience in undertaking rehabilitation activities in WA and overseas. <u>What is the type of vegetation being rehabilitated?</u> The plan for the Project is to return vegetation that is comparable to the pre-clearing communities	<u>Quality</u> The majority of the Study area is considered in Pristine or excellent condition. It is considered likely that rehabilitation will successfully achieve a vegetation condition comparable to predisturbance. <u>Conservation Significance</u> Clearing will result in the removal of a number of Priority and Noval plants within the Disturbance. <u>Land Tenure</u> The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure <u>Time Scale</u> Rehabilitation will be undertaken progressively over the life of the Project No residual impact predicted.	N/A	N/A	N/A	N/A	N/A
Introduction of *Phytophthora cinnamoni* (dieback)	Minimise: Implement hygiene procedures for vehicle and equipment to limit the entry of *Phytophthora* Dieback and weeds. Phytophthora Dieback uninterpretable vegetation will be managed as if it were infested to reduce the potential for accidental introduction or spread to areas within the Project area which are uninfested. A registered Dieback interpreter will assess and map potential occurrence adjacent to the cleared areas every three years.	Hygiene requirements will be incorporated into rehabilitation activities and rehabilitation will occur progressively across the site.	<u>Can the environmental values be rehabilitated/Evidence?</u> Based on the natural rehabilitation that has occurred onsite it is expected that rehabilitation will be effective. <u>Operator experience in undertaking rehabilitation?</u> MRC Graphite parent company and staff have experience in undertaking rehabilitation activities in WA and overseas. <u>What is the type of vegetation being rehabilitated?</u> The plan for the Project is to return vegetation that is comparable to the pre-clearing communities	<u>Quality</u> The majority of the area has been classified as uninterpretable, where indicator species were present no *Phytophthora* Dieback infestations were observed. The only dieback occurrences identified with on Farmers Road, which will be used to access the site. <u>Conservation Significance</u> It is acknowledged that *Phytophthora* Dieback will impact the Kwongkan Shrublands TEC is dieback was to be introduced. <u>Land Tenure</u> The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure <u>Time Scale</u> Monitoring and management of dieback will be undertaken during operations consistent with the *Phytophthora* Dieback Management Plan No residual impact predicted.	N/A	N/A	N/A	N/A	N/A

Existing environment/ Impact	*Mitigation*			*Significant Residual Impact*	*Offset Calculation Methodology*				
	Avoid and minimise	*Rehabilitation Type*	*Likely Rehab Success*		*Type*	*Risk*	*Likely offset success*	*Time Lag*	*Offset Quantification*
Spread of weeds	Minimise: Review existing weed occurances and signpost areas of significant weed infestations. Implement hygiene procedures for vehicle and equipment to limit the entry and spread of weeds.	Hygiene requirements will be incorporated into rehabilitation activities and rehabilitation will occur progressively across the site	Can the environmental values be rehabilitated/Evidence? Based on the natural rehabilitation that has occurred onsite it is expected that rehabilitation will be effective. Operator experience in undertaking rehabilitation? MRC Graphite parent company and staff have experience in undertaking rehabilitation activities in WA and overseas. What is the type of vegetation being rehabilitated? The plan for the Project is to return vegetation that is comparable to the pre-clearing communities	Quality Eighteen environmental weeds have been recorded none where identified as Weeds of National Significance (WONS) or Declared Pests (weeds). The majority of the Study area is considered in Pristine or excellent condition. Conservation Significance None weeds were identified as Weeds of National Significance (WONS) or Declared Pests (weeds). Land Tenure The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure Time Scale Monitoring and management of weeds will be undertaken during operations consistent with the Flora and Vegetation Management Plan No residual impact predicted.	N/A	N/A	N/A	N/A	N/A
Loss and fragmentation of conservation significant fauna habitat (Malleefowl, Chuditch, Carnaby's Cockatoo, Red-tailed Phascogale)	Avoid: Chuditch, Carnaby's Cockatoo, Red-tailed Phascogale breeding habitat to be removed. No Malleefowl mounds will be removed. Minimise: Project footprint design to minimise impacts on possible conservation significant fauna habitat. Clearing within the Munglinup River corridor will be avoid where possible and clearing minimise.	Rehabilitation will occur progressively across the site. All disturbance other than the open pits will be rehabilitated.	Can the environmental values be rehabilitated/Evidence? Based on the natural rehabilitation that has occurred onsite it is expected that rehabilitation will be effective. Operator experience in undertaking rehabilitation? MRC Graphite parent company and staff have experience in undertaking rehabilitation activities in WA and overseas. What is the type of vegetation being rehabilitated? The plan for the Project is to return vegetation that is comparable to the pre-clearing communities	Quality Since 2014, possible Malleefowl breeding habitat comprised of Eucalyptus woodland and Major Drainage line has been identified, currently these area lack of leaf litter material and is too dense for mound construction. The Project will remove up to 2.08% of the possible Malleefowl breeding habitat and 13.62% of the possible foraging habitat. Possible Chuditch and Red-tailed Phascogale foraging habitat have been observed, however no signs of usage have been observed. No habitat suitable for Carnaby's Black Cockatoos breeding has been identified in the Project area, suitable foraging habitat does exist in the form of Proteaceae Dominated Shrubland. Conservation Significance In 2014 a single Malleefowl was observed within the Project area and a flock of Carnaby's Black Cockatoos were observed. Land Tenure The Project is location within the	Acquire land with suitable habitat for Malleefowl, Chuditch and other Conservation significant species.	Medium Locating a property in the region that meets all the habitat requirements may be challenging. Acquisition will be made in consultation with Parks and Wildlife and DAWE.	High Potential offset land parcels have already been identified.	Minimal time lag – the property will be acquired within 5 year of commencement of the Project	MRC Graphite will work with South Coast NRM and other Conservation groups in the region to reduce impact associated with feral species on Malleefowl and other Conservation Significant Fauna. MRC Graphite will first look to acquire land that can directly offset any impacts to to Kwongkan Shrublands TEC and Malleefowl breeding habitat. MRC Graphite will attempt to offset the 336ha of significant impact clearance by a 390ha offset target area with similar habitat and average habitat quality

Existing environment/ Impact	*Mitigation*			*Significant Residual Impact*	*Offset Calculation Methodology*				
	Avoid and minimise	*Rehabilitation Type*	*Likely Rehab Success*		*Type*	*Risk*	*Likely offset success*	*Time Lag*	*Offset Quantification*
				Munglinup Mining Reserve (R24714) and Mining Act Tenure <u>Time Scale</u> Monitoring and management of threatened fauna species and habitats will be undertaken during operations consistent with the Terrestrial Fauna Management Plan Residual impacts note considered to be significant because direct impact possible Malleefowl breeding habitat is less than 5% and less than 15% of possible Malleefowl foraging habitat. Malleefowl are either absent from the study area or in low densities that make them difficult to detect as no Malleefowl or their mounds were recorded during the last survey in 2019. The habitat in the study area is likely suboptimal.					
Loss and fragmentation of potential habitat for SREs (no Confirmed SRE species, four Likely SRE species and 10 Possible SRE species collected from within the Development Envelope)	Avoid Disturbance footprint designed to reduce disturbance to fauna habitats. Minimise Project footprint design to minimise impacts on fauna speceis. Clearing within the Munglinup River corridor will be avoid where possible and clearing minimise.	Rehabilitation will occur progressively across the site. All disturbance other than the open pits will be rehabilitated.	<u>Can the environmental values be rehabilitated/Evidence?</u> Based on the natural rehabilitation that has occurred onsite it is expected that rehabilitation will be effective. <u>Operator experience in undertaking rehabilitation?</u> MRC Graphite parent company and staff have experience in undertaking rehabilitation activities in WA and overseas. <u>What is the type of vegetation being rehabilitated?</u> The plan for the Project is to return vegetation that is comparable to the pre-clearing communities	<u>Quality</u> No Confirmed SRE species were recorded during the field survey. The Likely SRE species were recorded within the laterally continuous Mallee Shrubland or Eucalyptus Woodland habitats, with only a single specimen of the Likely SRE isopod species Acanthodillo sp. indet. recorded from the Proteaceous Kwongkan Shrubland habitat. All the Possible SRE species are known to occur more widely in the region or were often recorded at multiple locations <u>Conservation Significance</u> No Confirmed SRE species have been recorded <u>Land Tenure</u> The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure <u>Time Scale</u> Rehabilitation will be undertaken as specified in Mine Closure Plans **Residual impacts** not considered to be significant because the Project has been designed to minimise impacts on Acanthodillo sp. Indet habitat and the	N/A	N/A	N/A	N/A	N/A

Existing environment/ Impact	*Mitigation*			*Significant Residual Impact*	*Offset Calculation Methodology*				
	Avoid and minimise	*Rehabilitation Type*	*Likely Rehab Success*		*Type*	*Risk*	*Likely offset success*	*Time Lag*	*Offset Quantification*
				other habitats where likely SRE are laterally continues.					
Mining Activities – all phases									
Indirect impacts from dust on vegetation and fauna habitats	Minimise: Dust suppression, including use of water carts on access roads, stockpiles and waste rock landform, to be implemented during all Project phases.	Potential impacts will cease once mining and closure activities are complete.	Impacts limited to duration of site activities.	<u>Quality</u> The majority of the Study area is considered in Pristine or excellent condition. It is considered likely that rehabilitation will successfully achieve a vegetation condition comparable to predisturbance. <u>Conservation Significance</u> Up to 2.67% of the Kwongkan Shrublands TEC will be impacted b the disturbance footprint. All of the cleared TEC will be rehabilitated <u>Land Tenure</u> The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure <u>Time Scale</u> Dust suppression will be undertaken during the operations phase **Residual impacts** not considered to be significant because the Dust management measures are expected to prevent impacts to vegetation health.	N/A	N/A	N/A	N/A	N/A
Vehicle strikes	Minimise: Vehicles and mining equipment access limited to designated roads/access tracks and cleared areas Designated speed limits on access and haul roads to reduce fauna strikes.	Potential impacts will cease once mining and closure activities are complete.	Impacts limited to duration of site activities.	<u>Quality</u> Eucalyptus woodland and Major Drainage line has been identified as possible Malleefowl Breeding habitat. Possible Malleefowl, Chuditch and Red-tailed Phascogale foraging habitat have been observed, however no signs of usage have been observed. <u>Conservation Significance</u> In 2014 a single Malleefowl was observed within the Project area and a flock of Carnaby's Black Cockatoos were observed. <u>Land Tenure</u> The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure **Residual impacts** not considered to be significant because Noise and vibration emissions from machinery and vehicles may assist to deter some species from transportation routes. Ground-dwelling species are at	N/A	N/A	N/A	N/A	N/A

Existing environment/ Impact	Mitigation			Significant Residual Impact	Offset Calculation Methodology				
	Avoid and minimise	Rehabilitation Type	Likely Rehab Success		Type	Risk	Likely offset success	Time Lag	Offset Quantification
				greatest risk of vehicle strike. The overall risk to vertebrate fauna is low and unlikely to result in a change of conservation status.					
Noise and vibration, light emissions impacts	Minimise: Lighting designed to illuminate designated operations areas rather than the surrounding landscape.	Potential impacts will cease once mining and closure activities are complete.	Impacts limited to duration of site activities.	<u>Quality</u> Amenity values can be highly subjective, with different levels of perception or tolerance of impacts. <u>Conservation Significance</u> In 2014 a single Malleefowl was observed within the Project area and a flock of Carnaby's Black Cockatoos were observed. No Chuditch or Red-tailed phascogales recorded <u>Land Tenure</u> The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure No residual impact predicted.	N/A	N/A	N/A	N/A	N/A
Sedimentation of the Munglinup River	Avoid: Landforms designed to lie outside of flood impact zones and Infrastructure has been located to avoid natural drainage channels Minimise Operations: - Segregation of clean and dirty stormwater is the primary mitigation measure to protect local surface water quality. Stormwater diversion away from mining infrastructure and capture and treatment of contaminated stormwater will be implemented.	Potential impacts will cease once mining and closure activities are complete.	Impacts limited to duration of site activities.	<u>Quality</u> The Project is located within the Munglinup River and the Oldfield River catchment. Changes in catchment less than 4% and 1.5% respectively. Munglinup River can be considered saline, alkaline, clear and well oxygenated. <u>Conservation Significance</u> No Ramsar Convention wetland or Nationally significant lakes or Rivers. No State or Federal listed macroinvertebrate species of conservation significance have been recorded <u>Land Tenure</u> The Project is location within the Munglinup Mining Reserve (R24714) and Mining Act Tenure **Residual impacts** not considered to be significant because the project is estimated to impact less that 4% of the surface flows into the Munglinup and 1.5% of the Oldfield River catchments.	N/A	N/A	N/A	N/A	N/A

8.2 Offset Proposal

MRC Graphite will work with South Coast NRM and other Conservation groups in the region to reduce impact associated with feral species on Malleefowl and other Conservation Significant Fauna.

MRC Graphite will first look to acquire land that can directly offset any impacts to to Kwongkan Shrublands TEC and Malleefowl breeding habitat.

MRC Graphite will also engage with South Coast NRM and other Conservation groups in the region to implement indirect offsets.

The quantum of offsets has been determined by national guidelines and the EPBC offset calculator (APPENDIX I: MNES Offset Supporting Document).

MRC Graphite will attempt to offset the 336ha of significant impact clearance by a 390ha offset target area with similar habitat and average habitat quality (see detailed calculations in Appendix I).

This would normally involve acquisition of privately owned land within the same region within a maximum period of 5 years.

If any similar land can be acquired by the time mining start, then the Offset will be secured via a Voluntary Declaration (VDec). A VDec is a means to secure an Offset so the area can then be noted as high conservation value.

The land in question will then be managed under an approved Offset Management Plan.

If a land acquisition is not sufficient (due to its size), then an Indirect Offset will also be added as follows:

Indirect Offsets during the life of mining project will be implemented including research projects related to Malleefowl, Community Conservation Projects and Conservation of land related to the specific impacts.

In this regards MRC Graphite intends to start engaging with the following groups

- Munglinup Local Farmers Group
- The Cocanarup Conservation Alliance Inc in Ravensthorpe
- Birdlife Australia
- Western Australian Malleefowl Recovery Group
- DBCA and DBCA regional office Esperance on local recovery plans

The offset supporting documents in APPENDIX I: MNES Offset Supporting Document outlines the details of how the offset area has been estimated and what assumptions were made.

9 Conclusions

9.1 Summary of EPA Factors

The Munglinup Graphite Project is located within the great southern of Western Australia and, should the Project be approved, would involve the extraction and processing of one of the world's highest-grade graphite deposits. The development of the Project will contribute to a growing global battery market, contributing to the clean energy market and energy innovation. The proposal will also bring economic and employment opportunities to the south-coast region for residents, indigenous groups and small businesses via production of a key component of the transition to renewable energy (the production of long-life batteries). The Project is significant not only for WA, but for Australia, as this will be the first graphite mine in Australia since 1945 (when graphite was initially mined in the region).

MRC Graphite has undertaken a range of baseline environmental assessments to gain a thorough understanding of the surrounding environmental and heritage values. Further baseline studies have been undertaken to address the request for further information, these include:

- Flora and vegetation;
- Fauna including vertebrates;
- Short range endemics;
- Groundwater;
- Surface water;
- Ecological Linkages; and
- *Phytophthora* Dieback.

Particular consideration was given to conservation significant features such as the Proteaceae Dominated Kwongkan Shrublands TEC, Black Cockatoos, Chuditch, Malleefowl, Red-tailed Phascogales and the Sedge, *Conostylis lepidospermoides*.

The TEC community will be avoided as much as possible which in turn also avoids foraging habitat of the Carnaby's Black Cockatoo. MRC Graphite identified four key environmental factors potentially impacted by the Project, these being Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surrounds.

A direct impact to flora and vegetation is recognised through ground disturbance of up to 650ha of vegetation, including 10-33ha of the Kwongkan Shrublands TEC. This also represents fauna habitat, including 5.72ha of mapped Carnaby's Cockatoo foraging habitat. Surveys have identified the vegetation and fauna habitats impacted by the Project activities also occur outside of the development envelope. However, there are no significant residual impacts to threatened or significant flora or fauna taxon expected from clearing of the development envelope or within the Project area.

The Project will also involve alterations to surface water flows and the abstraction of groundwater. These activities are unlikely to have significant downstream impacts.

It is acknowledged that the Project will interact with Aboriginal Heritage values in the local areas, however these impacts are not envisaged to extend beyond the Project area.

Implementation of appropriate mitigation measures by MRC Graphite will meet EPA's requirements for the key environmental factors of flora and vegetation, terrestrial fauna and inland waters.

9.2 Summary of Impacts in a Regional Context

The Project is located within the south-west of Western Australia and the internationally listed Southwest Biodiversity Hotspot, (classified as such by the concentration endemic species and the threats facing these species (Myers, et al., 2000). Biodiversity Hotspots are considered priorities for biodiversity conservation. The south coast region occupies the eastern part of the South West Botanical Province and Biodiversity Hotspot (DPaW, 2013).

Within the south-coast region the diversity of natural ecosystems also coexists with a variety of intensive land-use practices including agriculture, mining and forestry (Pettit, et al., 2015). These

natural ecosystems are persisting in the region in modified landscapes and within conservation estates (Pettit, et al., 2015). The result is a region with a mosaic of intact and highly altered ecosystems (Pettit, et al., 2015).

In the regional context, 51.53% of natural vegetation is remaining within the Esperance Plains IBRA Bioregion and 47.29% of natural vegetation is remaining within the Recherche IBRA Sub-Region (ESP02) (Government of Western Australia, 2018). Three of the mapped Beard's vegetation system associations occur within the development envelope. These have been assessed using the CAR system. Vegetation unit 516 and 47 – mallee-heath, both of which have 40.7% and 14.09% of natural vegetation remaining respectively (Woodman Environmental, 2020a). These figures provide a broad indication only, given the scale of the vegetation mapping.

Ecosystems encompass all biotic and abiotic factors in an area which interact with one another. The complex interactions and relationships between these biotic and abiotic components help to support and maintain ecosystem functions. The study of ecology in natural areas highlights how changes or impacts to biotic and abiotic components of ecosystems can influence ecosystem functions and lead to degradation of the ecosystem. For example, altered fire regimes can change vegetation structure which in turn can alter fauna assemblages for decades. Taking a holistic approach to environmental impacts can provide an alternative way to determine or understand how a proposal could influence the natural environment within a local and regional context. Two of the major threats to biodiversity and ecosystems in the region are habitat loss and fragmentation of vegetation communities, both of which can limit the viability of populations through isolation and limited dispersal, such is true for both fauna and flora (DPaW, 2013). Landscape connectivity is recognised globally as an important factor in biodiversity conservation (Wilkins, et al., 2006).

The implementation of the Project will result in some impacts to the environment. These are primarily related to the clearing of vegetation and fauna habitat, and the alteration of surface water flows through ground disturbance of up to 350ha. Other factors such as waste management and the construction of landforms could also alter ecosystem functions. Within a regional perspective, these activities have the potential to further reduce natural vegetation extent and contribute to habitat loss and fragmentation.

9.3 Conclusions

Overall, the Project will provide a benefit to the communities of Munglinup, Esperance and Ravensthorpe by providing jobs and increasing economic activity and assist WA progress its renewable energy transition through the production of long-life batteries. The Project is significant not only for WA, but for Australia, as this will be the first new graphite mine in Australia since 1945 when graphite was initially mined in the region.

MRC Graphite are confident that the environmental impacts outlined can be appropriately managed through the measures discussed in this document. The Project will result in disturbance to vegetation and fauna habitats from a local perspective, however the disturbance is not considered significant. Within the regional context, MRC Graphite acknowledges the Munglinup River Corridor is an important ecological linkage between the coast and the Great Western Woodland; however it is not in isolation, being one of three that exist in the region that are important for species and gene flow. The impacts from the project are anticipated to be moderate.

MRC Graphite is confident that the key environmental factors of Flora and Vegetation, Terrestrial Fauna and Inland Waters can be met.

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FIGURES

(Figures in A4 and A3 size)

APPENDIX A: LETTER OF AUTHORITY

APPENDIX B: STAKEHOLDER ENGAGEMENT REGISTER

Date	Type of Engagement	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback	Response to Feedback / Outcomes / Comments
7-Feb-18	Meeting / Briefing	Department of Mines, Industry Regulation & Safety	Summary of discussion is below. For full details see the Stakeholder Record Form / Minutes / Presentation. - Overview of the Munglinup Project with a PowerPoint presentation - Authorisation: It was stress that when submitting POW or Mining Proposal it is critical that if the submitter is not the tenement holder, then a letter or copy of the agreement must be attached providing evidence that the submitter has the tenements holder approval to undertake activities on the tenement. - Tailings Management: due to the typical annual rainfall plus with significant rain event, the proponent will need to ensure the design and operations of the TSF will need to focus on rainwater management to provide overtopping or limit seepage. - Road Access: the selection of the access road into the site, and the offsite haulage of the product must take into consideration stakeholder feedback - Water: to date no onsite groundwater and surface water assessment has been completed, it is hoped that an adequate groundwater supply can be obtained from the mining areas, preventing the need for offsite supplies. - EPA / EPBC Approvals: if the project is lodged with DMIRS without the proponent referring or discussing the project with the WA EPA or DoEE and there is a significant environmental trigger, there is a risk to the project timeline because DMIRS may need to refer or liaise with one or both agencies. - Lead Agency: Clare will liaise with Graham Cobby to see if the project could be facilitated through the lead agency framework. Clare will provide feedback. - Timeline: to achieve the best possible assessment timeline it is critical the mining proposal contains all the required information, provides an appropriate level and quality of baseline environmental information to enable the assesses officer to undertake their assessment. It is also essential that effort is made to ensure baseline information helps to identify the really critical environmental factors rather than issues that are a result of poor or inadequate information. The conceptual timeline seems challenging particularly if the proponent does not adequately engage with other decision makers. - Baseline surveys: it was agreed that knowledge gaps for the project areas need to be adequately addressed. - Stakeholder: Best opinion of contact for the EPA is Robert Hughes, and the proponent is recommended to include R.A.I.N – Ravensthorpe Agricultural Initiative Network in their stakeholder engagement activities		Knowledge gaps for the project areas need to be adequately addressed. Including baseline surveys and water supply.
21-Feb-18	Presentation	Esperance / Munglinup Community	Summary of discussion is below. For full details see the Stakeholder Record Form / Minutes / Presentation. - Overview of the company MRC - Overview of the proposed Munglinup Graphite Project - Overview of mining history at the location - Preliminary site layout - Overview of environmental assessments completed and additional work required - Perceived benefits to the community - Identification of key stakeholders		

Date	Type of Engagement	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback	Response to Feedback / Outcomes / Comments
22-Feb-18	Meeting / Briefing	Department of Biodiversity, Conservation & Attractions - Parks & Wildlife Service	Summary of discussion is below. For full details see the Stakeholder Record Form / Minutes / Presentation. - Reserve Responsibilities: The Mining and Parkland reserves are not managed by DBCA. DBCA has involvement only in relation to fire, weeds and ferals. Need to check the Regional Management plan as there may be proposals for the adjacent parkland to be transferred to the Conservation estate. - Parks & Wildlife: the section within Parks and Wildlife that are likely to be interested in the project are Species and Communities and possible Environmental Management Team – Chris Bishop. Recommend talking to Chris re DBCA involvement moving forward. - Dieback: a dieback assessment has been completed in the project areas by DBCA, the SW corner of the tenement was included, and dieback was recorded. DBCA should be able to share the report once available.		Future consultation with DBCA should be through the Species and Communities Branch
22-Feb-18	Meeting / Briefing	Shire of Esperance	Summary of discussion is below. For full details see the Stakeholder Record Form / Minutes / Presentation. - Project location - Site access: Access to the site is likely to be via Mills Road which is in Shire of Ravensthorpe. Both local governments are seen as important stakeholders. - Water: Water disposal strategy, where practical all water will be recycled through the plant and water would only be released from site under emergency rain events. - Tailings: Consideration is being given to in pit tailings - Flooding: Recent flooding events in the area including the Munglinup River - Adjacent Landholders: MRC is adopting a good neighbour policy and is seeking to touch base with all relevant stakeholders and neighbouring landholders. MRC provided a list of adjacent land holder lots that they hope the Shire if able to provide contact information on. - Employment Opportunities: What is the projected workforce? As it currently stands post construction the operation is likely to employee 70-80 people with potentially a weekday roster for mining and support staff, processing will be 24hr/7 days. It is envisaged that staff would live regionally with buses running to and from site from Esperance and Ravensthorpe. - Tenure Expiry: what is the mine life? Current project life is 9-year with potential for extensions as the deposit is open on all sides. - Downstream Processing: Would battery manufacture occur in the Esperance Region? Currently unlikely that battery manufacture would happen in Esperance as key inputs are not readily available in Esperance. - Shire Involvement: No or limited involvement in approvals for the Project. Consideration may be given to undertaking some activities on private land, the shire does allow industry activities to occur on rural land. - Power: Powerline run past the project and there is power available via the Esperance PowerStation. The project will need some onsite back-up system to manage outages, consideration is being given to batteries and solar and a return of surplus power to the grid. Shire is happy to make the introduction to Horizon. - Next Steps: Complete the PFS and FS, recommend to the board		Summary of discussion is below. For full details see the Stakeholder Record Form / Minutes / Presentation. - Shire to provide surrounding landholder contact details - Continued contact with the Shire of Esperance

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			mid-year. Project timelines currently has mining commencing in early 2019, critical path is likely to be the environmental approvals.		
22-Feb-18	Media Release	Esperance / Munglinup Community	• 10-minute Q&A discussion and recording carried out for inclusion in the weekly "Resources report for the Goldfields, Esperance, Mid-West and Wheatbelt region of WA", ABC Regional Radio. • Emphasised the strategic importance of the project and interest as a regional development project. • Opportunities for majority local employment and encourage workforce residential in regional towns.		
23-Feb-18	Meeting / Briefing	Esperance Tjaltjraak Native Title Aboriginal Corporation	Summary of discussion is below. For full details see the Stakeholder Record Form / Minutes / Presentation. - Overview of the Munglinup Project - Heritage surveys and possibility for sites to exist within the area and heritage approval being required. ETNAC have arrangements with archaeological and ethnological specialists and TOs to do this work - Ranger teams will be starting in the region soon - Tailings management and advising if tailings will be hazardous - Wetlands and possible discharge to the Munglinup River should not be hazardous or have downstream impacts - ETNAC are interested in contracting opportunities - Heritage surveys should be completed before exploration activities.		Summary of discussion is below. For full details see the Stakeholder Record Form / Minutes / Presentation. - Agreed to undertake heritage surveys prior to exploration activities - An aquatic fauna survey will be completed to the Munglinup River to assess potential impacts - Surface & Groundwater studies have been commissioned - Consideration given to completing a heritage survey over the project area
02-Mar-18	Site Visit	Esperance Tjaltjraak Native Title Aboriginal Corporation	On the 2 March 2018 representative from the Esperance Tjaltjraak Native Title Aboriginal Corporation, MRC Graphite Pty Ltd and field personnel undertook a field inspection of proposed exploration activities located within M74/245. The field inspection sought to identify potential areas of heritage concern associated with the location of proposed exploration activities.		Two proposed new RC lines (site 8 and 13) are located in uncleared areas close to the river and within an area of Zamia palm not common within M74/245. It was agreed that these two lines should be cleared under the supervision of Heritage Monitors preventing any impacts to potential heritage values.
13-Mar-18	Email	Esperance Tjaltjraak Native Title Aboriginal Corporation	Email regarding the progression of the ethnographic assessment of M74/245 and the archaeological assessment of the proposed site footprint and the production of two reports, one for the ethnographic assessment and the other for the archaeological assessment.		
28-Mar-18	Meeting / Briefing	Department of Mines, Industry Regulation & Safety	1. Overview of the Munglinup Project including footprint 2. Status of PFS / FS and Project Timeline 3. Status of activities for regulatory approvals (stakeholder communications, surveys, etc) 4. Status of baseline surveys completed and underway 5. Process Moving Forward • Define extent of DMIRS/RH involvement • On-going communication channels / meeting programme / proposed attendees • Process for various submissions (DMIRS and non DMIRS approvals) • First Step: briefing of other agencies, including DBCA, EPA, DWER, DMIRS (R&S); co-ordinated information meeting to be held by mid-April.		

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9-Apr-18	Email	Department of Mines, Industry Regulation & Safety	Email requesting confirmation of clearing permit requirements with a POW. Email Question: MRC are submitted a POW for the following activities (via the spatial POW system) and the DMIRS system is suggesting they need a Clearing Permit. It was my understanding that having an approved POW provided an exemption under the EP Native Vegetation Clearing Regs.		Email Response: It's likely they are hitting the mapped extent of the TEC thereby intersecting with an ESA. Clearing for exploration is not exempt in an ESA, so the system is flagging that a clearing permit may be required. The clearing permit question will not prevent them from submitting (i.e. they do not need a clearing permit application in place to submit the PoW), so I recommend they provide some extra comments to say that the tenement has been surveyed and the most likely occurrences of the TEC will be avoided.
10-Apr-18	Email	Department of Water and Environmental Regulation	Email requesting confirmation that the Munglinup Project is not located within a proclaimed surface or groundwater area and thus does not require a 26D or a 5C		With regards to your query below, licensing to construct wells and take groundwater outside of proclaimed areas is only required when a well accesses an artesian aquifer.
12-Apr-18	Letter	Shire of Esperance	Letter notification of miscellaneous licence application for pending tenement M74/51 to connect M74/245 with the Clayhole road reserve to the north-east.		
12-Apr-18	Letter	Esperance Tjaltjraak Native Title Aboriginal Corporation	Letter notification of miscellaneous licence application for pending tenement M74/51 to connect M74/245 with the Clayhole road reserve to the north-east.		
12-Apr-18	Letter	FORTI, Luke Alexander – E74/565	Letter notification of miscellaneous licence application for pending tenement M74/51 to connect M74/245 with the Clayhole road reserve to the north-east.		Letter bounced. Resent on 18 April 2018.
12-Apr-18	Letter	PA Tucker Pty Ltd	Letter notification of miscellaneous licence application for pending tenement M74/51 to connect M74/245 with the Clayhole road reserve to the north-east.		

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18-Apr-18	Meeting / Briefing	Esperance Tjaltjraak Native Title Aboriginal Corporation	As discussed, MRC have a long history in dealing with landowners, albeit in foreign jurisdictions, and understand the importance of appropriate engagement. Mark has also had more direct dealings with Traditional Owners with his earth moving business in Western Australia. We understand that with the project being in a Mineral Reserve, native title has been extinguished and there is no requirement for a formal agreement with the Traditional Owners. That being said, we respect and appreciate the connection the Esperance Nyungar people have with the land and will make sure that any appropriate opportunities the project may create will be discussed with ETNTAC. We need to make sure that expectations are properly managed and any opportunities that are appropriate for your members to partake in are commercial, and sustainable. MRC has no issue in supporting, through various economic and other mechanisms, ETNTAC's endeavours in this regard so long as there is that commercial sustainability underpinning the engagement. With this in mind we suggest that as a first step in building this relationship ETNTAC provide MRC with some statement of current and near term capability, especially with regard to your new ranger program, and any opportunities that you feel would fit with those capabilities. As discussed, I believe that there may be some opportunity in the first instance to provide support in monthly environmental baseline data collection. When the timing is appropriate there is also the potential for seed collection and a subsequent nursey which, once we have begun rehabilitation works, could rely on MRC as a cornerstone client with contracts for long term delivery of tube stock and such. I am certain that other opportunities will also arise in areas such as training and up-skilling, direct employment, sponsorship of education programs, support businesses and other possible appropriate activities.		Our Rangers participation in monthly environmental baseline data collection is something we would welcome. I believe that there may be scope to include such activities within our Rangers TAFE certification process (discussed further below), which may give MRC some assurance that the monitoring would meet required standards. Essentially, from 1 May we will have a team of 12 male and female Rangers under the supervision of a Coordinator. The Rangers will be enrolled in two Cert III through South Regional TAFE (Indigenous Land Management and Aboriginal Sites Work). As mentioned above, environmental monitoring is a core skill set. Within a six-month period, the Rangers will also be trained in: - Remote area first aid - Chemical weed control - Green card (dieback control) - Fauna handling and - Bush fire-fighting (national accreditation). We are also currently working on an Economic Opportunity Plan for the Esperance Nyungars which will be completed by the end of June. I know that native seed collection and the establishment of a native nursery is likely to be identified as a potential business opportunity which also meets strategies under the HCP. We are in very preliminary discussions with the Water Corporation and Indigenous Land Corporation about support for such a project. No doubt the more potential project partners the better. In terms of other commercial opportunities that we would like to pursue – we are a blank canvas in that any opportunity that is not incompatible with our members' interests will be considered. The need to prioritize opportunities based on a long-term view of the Esperance economy is why we are preparing the Economic Opportunity Plan as a first step.

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23-Apr-18	Email / Letter	Shire of Esperance	Shire of Esperance received letter regarding Miscellaneous Licence application and emailed ISPL to request additional information.	Email reads: The Shire of Esperance is in receipt of your miscellaneous license application for the Munglinup Graphite project, and requests the following information to enable us to make comment on the proposal: 1) What is the proposed size of the operation? 2) What is the proposed annual tonnage of material to be extracted from the site? 3) Approximately how many vehicle movements will this equate to? 4) Are we correct in assuming that vehicles leaving the site will be heading to the Port of Esperance via the South Coast Highway and Harbour Road, or are you looking at alternative shipping arrangements (i.e. Albany, Bunbury, etc)? This will enable us to determine what level of road maintenance agreement or road construction we will require as part of the application.	MRC Graphite response to the questions raised: 1) What is the proposed size of the operation? The mining operation is anticipated to reach a maximum annual material movement of 3Mtpa. Processing throughput is planned to be 400ktpa. This is based on the outcomes of the current PFS. 2) What is the proposed annual tonnage of material to be extracted from the site? Based on the outcomes from the PFS an annual average of 56kt of graphite concentrate will be produced. 3) Approximately how many vehicle movements will this equate to? Assuming 24t per 20" container we estimate average annual movement of 100 trucks per month (2 containers on each) for product. There is likely to be a couple of containers each month for operational consumables and spares. There will likely be a couple of light vehicles each day and a bus in/out each shift. 4) Are we correct in assuming that vehicles leaving the site will be heading to the Port of Esperance via the South Coast Highway and Harbour Road, or are you looking at alternative shipping arrangements (i.e. Albany, Bunbury, etc)? We are still working through the logistics, but the idea is to ship the concentrate out through Esperance port to various destinations including Kwinana. There may be an option to take a portion (up to 10ktpa) directly from Munglinup to Kwinana via the main highway or rail. This is currently being investigated.
24-Apr-18	Phone Call	PA Tucker Pty Ltd	Phone call regarding activities which occur on Clayhole Road that could be impacted by the miscellaneous licence application.	Issue raised during phone discussion: 1. Concern that Clayhole Rd would be closed to public access once upgraded 2. The road is used as a makeshift runway for spraying activities and exploration/development activities would interfere with a planned spray next week 3. He also indicated that he would probably have to build a proper runway on a paddock soon as using the road is technically illegal however the shire looks the other way for the moment. 4. Discussion on purchase of his land adjacent to the mining lease.	Outcomes from the phone discussion: 1 and 2. I assured Phillip that we would not be asking council to close the road to the public and that there is no activity planned in the area for at least the next 6 months. He was happy with this, had no issue with MRC and is keen to discuss the project further. 3. I suggested that when he selects a location for a new runway MRC may be able to assist in construction of the runway in some way shape or form, especially if we could have access. 4. He stated that he is about to put a large parcel on the market which I believe includes the paddock directly south of the Mining Lease. We need to check this with Phillip. He did not want to break apart the land parcel and indicated that the parcel is probably worth around $9 million based on recent sales. There may be scope to purchase then on-sell the land not required or convince Phillip to carve out a small parcel directly south of our Mining lease.
23-27-Apr-18	Site Visit	Esperance Tjaltjraak Native Title Aboriginal Corporation	A weeklong Archaeological and Ethnographic survey of MRC Graphite Tenure with Applied Archaeology Australia (AAA) consultants and representatives from the Esperance Tjaltjraak Native Title Aboriginal Corporation. The purpose of the survey is to identify sites of cultural significance.		
30-Apr-18	Phone Call	Luke Forti	ISPL received a phone call from exploration tenement holder Luke Forti regarding Misc. Licence application and potential conflicts with a proposed mining licence across the area. Indication was also given that the misc. licence area is a potential water source.		
7-May-18	Phone Call	Luke Forti	ISPL received a second phone call from exploration tenement holder Luke Forti regarding Misc. Licence application and potential conflicts with a proposed mining licence across the area.		The message was passed on for Daniel to contact Luke and all discussions regarding E74/565 to be had by Mark.

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5-Jun-18	Email / Letter	Department of Mines, Industry Regulation & Safety (DMIRS)	ISPL received an email from DMIRS providing an update on POW Reg ID 74373.	These were the two issues I raised: 1) Can you please provide some additional information on what clearing controls will be put in place during clearing to avoid any direct or indirect impacts to this TEC, including how ground truthing will be conducted? 2) The proposed exploration activities are located within the dieback risk area. I note dieback hygiene practices were outlined in PoW Reg ID 70830. Can you please also confirm that clearing and exploration activities will not be undertaken in wet soil conditions? The proponent did advise in the resubmitted PoW that a dieback survey had been done but the report was still being finalised. However, the recommendations in the report would be implemented. Unfortunately, these recommendations haven't been included in the PoW documentation. It would be of value to me to know what site-specific recommendations were made.	ISPL responded to address the issues raised with the following information: • Dieback – Attached to this email is a copy of the dieback assessment report. This assessment found no dieback within M74/245. It was noted that a significant proportion of the inspected are is uninterpretable due to the type of vegetation occurring. Dieback control measure proposed include: • Ensure all vehicles and machinery are clean upon arrival to site. This is particularly important for vehicles/machinery that have been working in other areas where dieback management may not be in place. • Soil movement from uninterpretable areas into uninfested areas is to be prevented. In wet conditions where soil adheres to vehicles and machinery, clean down will be required when entering uninfested areas from an uninterpretable area. • For operations undertaken during wet conditions, inspection/hygiene points, including washdown equipment will be required at the boundary between uninfested and uninterpretable areas. Vehicles should be inspected and washed down if necessary, before entering uninfested areas from uninterpretable areas. Inspection/washdown is not required when entering uninterpretable areas from uninfested areas. A Hygiene Management Plan would assist in identifying and outlining the necessary hygiene requirements. • Conduct operations under dry soil conditions. Where activities occur under dry soil conditions and soil does not adhere to vehicles and machinery, they may move from uninterpretable areas into uninfested areas without performing a clean down. • Operational areas that are located within uninfested areas are required to be assessed every 12 months. *Phytophthora* Dieback occurrence information expires 12 months after the assessment completion date in operational areas and is no longer valid after this period. No further assessments are required for uninterpretable areas, as the status of these areas will not change. • TEC Management – Mapped TEC areas are being redefined and mapped following Woodman Environmental May field trip and a TEC and Significant Values Induction to be rolled out for Exploration staff. This induction will ensure that personnel involved in pegging new areas to be cleared are able to identify and avoid TEC vegetation. The induction is being developed by ISPL with Woodman input. As the original POW was replaced, I will confirm if this restarts the clock.
6-Jun-18	Email / Letter	Department of Mines, Industry Regulation & Safety	ISPL received an email from DMIRS providing an update on POW Reg ID 74373	DMIRS advised the POW would be approved with the additional information provided	POW Reg ID 74373 approved
26-Jun-18	Meeting / Briefing	Esperance Tjaltjraak Native Title Aboriginal Corporation	Post heritage assessment meeting and site visit with AAA Consulting and ETNTAC representatives. The purpose of the field trip and meeting was to discuss the outcomes and recommendations of the AAA Heritage Report – which areas must be avoided, the plans for protecting the sites long term –		

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			lodgement in the state aboriginal Heritage database and a Project Update.		
27-Jun-18	Email / Letter	Department of Mines, Industry Regulation & Safety	POW 73238 submission to allow for the development of sumps for the Munglinup Test Pumping. A key driver for this request is to ensure that all water from the pumps test is required to effectively manage/limit the potential impacts on the environment. Without a collection area at each pilot bore there is a risk that the transfer of water will not occur at the same rate as the pump test potential resulting in the unplanned release of water.		POW assessed immediately and was approved on the 29/6/2918
28-Jun-18	Email / Letter	Esperance Tjaltjraak Native Title Aboriginal Corporation	Agreement of cultural monitors for work relating to the TSF access track, TSF test pits and turkeys nest. Once that work is completed we agree that we need to quickly move towards a Heritage Management Plan and that as a part of that plan MRC will not require cultural monitors when using previously cleared areas for other exploration activities such as the water bore pump testing and infill drilling.		Cultural monitors on site for this work
8-12-Jun-18	Site Visit	Esperance Tjaltjraak Native Title Aboriginal Corporation	Supplementary site visit to update the heritage report and include areas which were missed in the last field survey. This is as an outcome from the meeting on the 26th June 2018.		Revised heritage report
11-Jul-18	Meeting / Briefing	Goldfields Esperance Development Commission	Provided an overview of the project and development schedule. He advised that it would be advisable to engage with the local Esperance and Ravensthorpe Shires as soon as possible with respect to roads. Agreed need to understand our requirements better. In terms of normal operating conditions, the main highway should not be an issue as we will have a considerably smaller impact than Ravensthorpe Nickel. The issue is Farmer, Clayhole, Mills and Reynolds Rds. also mentioned that the GEDC now have the capability to undertake local and regional economic impact assessments. He has offered to undertake such an assessment of the Munglinup Project for free to assist in determining the likely impact of the operation to the local economy. This obviously has positives and negatives for MRC. He is going to get their analyst to contact us with the necessary inputs.		GEDC supportive of project and have capacity to assist with modelling economic impact of the project for the region.
14-Jul-18	Meeting / Briefing	Member of Government	Social: 1. MRC advised that it was looking to adopt a proactive and positive influence on the communities in which it operated. It has a strong track record on making a social contribution – with the example given of the recent initiatives it had been adopting through its operations in South Africa. Economic: 1. MRC advised that there would be up to 63 residentially based workers. However, it was expected that these would mainly be based in Esperance. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). MRC was also currently assessing the possibility of a 5-day working	Social: 1. Mr Graham raised no questions regarding the information that was provided, only noting that it was important to make a positive contribution to the community. Economic: 1. Mr Graham believed that it was important to look at a residentially based workforce given the significant economic and social impact of increasing job opportunities in regional areas. 2. Mr Graham also commented that the Government was keen to see positive action in respect of the procurement of local goods and services and utilisation of local businesses. This was consistent with the State Government's buy local policy - and believed that there were significant benefits to both the company and local economy to	Social: 1. MRC is looking to complete a Community Engagement Plan by early August 2018, which will include a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Economic: 1. As has already been stated, MRC will look at a residentially based workforce for its direct employees, as well as those employed by contractors, as a first option. 2. Industry briefing sessions will be a requirement of the Community Engagement Plan. It is planned to liaise with the

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			week and daily bus-in/bus-out arrangements for most workers. There will still be a need for a 24/7 operation of the concentrator which will involve some night shift arrangements. MRC was open to workers residing in Munglinup – given the short travel distance to the mine site. 2. MRC advised that it was in the process of developing local procurement and employment policies and would liaise with the Ravensthorpe and Esperance Chambers of Commerce and Industry on conducting industry briefing sessions. Environmental: 1. MRC provided an overview of the work which was currently underway in completing environmental background studies (inclusive of flora, fauna, subterranean and surface water etc.). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. It is also expected that Community Information Sessions will be held in both Munglinup and Esperance (date to be determined) – it is expected that there will be information provided about the environmental approval processes and the work being undertaken by MRC at the proposed Sessions. MRC's aim was to be as thorough is possible in respect to the work being undertaken regarding the environmental approvals and was ensuring that the process was as transparent as possible. Heritage: 1. MRC advised that it had been in discussions with ETNTAC and had undertaken heritage surveys with members of ETNTAC. Several sites of interest had already been identified. Other: 1. MRC advised that it was yet to complete a logistics study – with the final export pathway being determined by the end destination of the product. In the event that the product was to be exported to overseas markets, it was likely that it would be trucked from the mine site to Esperance Port. Given the low volumes of approx. 55,000 tonnes per year it was expected that truck movements would not be more than 3-4 a day. Mr Graham was also advised of MRC's recent discussions with the Local Governments about road access. 2. Discussions also covered issues related to opportunities for downstream processing, and the need for the State Government to be proactive in addressing the issues of regulatory approvals, the availability of suitable land and planning approvals/infrastructure to facilitate investment decisions by private sector in value adding/downstream processing opportunities.	adopt these sorts of strategies. Environmental: 1. Mr Graham raised no queries in respect of the information provided on the environmental approval processes being undertaken by MRC. Heritage: 1. No queries raised with respect to Native Title or heritage matters. Other: 1. Mr Graham requested that MRC give every consideration to utilising the Esperance Port, however also recognising the need to complete the logistics study and for export pathway to be economically viable and should be developed in the best way to allow MRC to cater to the global market. 2. Mr Graham advised that Premier was in Esperance the following week and he would raise this with him.	Goldfields Esperance Development Commission and Esperance and Ravensthorpe Chambers of Commerce such that any local sourcing strategies by MRC are complimentary to work being undertaken by these organisations. It is expected that the high level local procurement policies will be drafted by September 2018, with more detailed implementation methodology to be undertaken during October – December 2018. Environment: 1. MRC advised that it would keep Mr Graham informed of the environmental processes and advise when approvals had been referred to the relevant statutory authorities for consideration. Heritage: 1. MRC undertook to keep Mr Graham informed of the heritage work being undertaken. Other: 1. No further action 2. Liaison with State Government on down—stream processing opportunities currently being pursued by MRC Head Office.
16-Jul-18	Meeting / Briefing	Goldfields Esperance Development Commission	Social: 1. MRC advised that it was looking to adopt a proactive and positive influence on the communities in which it operated. It has a strong track record on making a social contribution – with the example given of the recent initiatives it had been adopting	Social: 1. Mr Liddelow noted the information provided and emphasised the need for any community support to be aimed at delivering sustainable outcomes. He advised that a significant level of support had been provided to local community organisations through the	Social: 1. MRC is looking to complete its Community Engagement Plan in early August 2018, which will include a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on

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			through its operations in South Africa. Economic: 1. MRC advised that there would be up to 63 residentially based workers. However, it was expected that these would mainly be based in Esperance. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). MRC was also currently assessing the possibility of a 5-day working week and daily bus-in/bus-out arrangements for most workers. There will still be a need for a 24/7 operation of the concentrator which will involve some night shift arrangements. 2. MRC advised that it was in the process of developing local procurement and employment policies and would liaise with the GEDC and ECCI. Environmental: 1. MRC outlined the substantial work which was currently underway in completing environmental background studies (inclusive of flora, fauna, subterranean and surface water etc). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. It is also expected that Community Information Sessions will be held in both Munglinup and Esperance in late August – these will include information about the environmental approval processes and the work being undertaken by MRC. MRC's aim was to be as thorough is possible in respect to the work being undertaken regarding the environmental approvals and was ensuring that the process was as transparent as possible. Heritage: 1. MRC advised that it had been in discussions with the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) and had undertaken heritage surveys with members of ETNTAC. Several sites of interest had already been identified. Future heritage survey work is planned in collaboration with ETNTAC and work is underway in developing a Cultural Heritage Management Plan which will set the protocols for current and ongoing management of heritage sites in accordance with State and Federal legislation. ETNTAC rangers have also been onsite monitoring clearing to ensure that no heritage sites are disturbed. MRC has also been in discussions with ETNTAC CEO to look at opportunities for future aboriginal employment and procurement of services. Other: Nil	Royalties for Regions funded Community Chest and Regional Grants Schemes. Mr Liddelow offered GEDC assistance in the development of a community based funding program, given their significant experience in grant funding. Economic: 1. Mr Liddelow advised that this approach was consistent with State Government regional development policy and aligned with the GEDC and Department of Primary Industries and Regional Development's local jobs initiative. Mr Liddelow touched on the economic impact of the cessation of the iron ore exports from Esperance and the softening of consumer demand for local businesses and services, as well as the easing of the rental and property markets. 2. Mr Liddelow advised that the GEDC had recently appointed a local content adviser to deliver on the State Government's local content/local jobs initiative. He advised that the GEDC could provide assistance in the development of local buying practices and procurement, as well as the development of business capacity to assist with tendering and compliance. Environmental: 1. Mr Liddelow noted the information provided advised that there had been some sensitivity in the community regarding potential environmental impacts and that this would need to be managed carefully given the recent experience with Alpha Fine Chemicals. Heritage: 1. Mr Liddelow noted the information provided and advised that MRCs approach was consistent with those advocated by both the GEDC and DPIRD, under the direction of their Minister Alannah MacTiernan. He advised that both agencies had been directed to deliver tangible opportunities to increase aboriginal employment and business development and commercial contracting opportunities. Other: Nil	the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Economic: 1. MRC will continue to look at a residentially based workforce for its direct employees, as well as those employed by contractors, as a first option. 2. MRC advised that it would welcome the assistance of the GEDC, and had planned to work with the GEDC and ECCI on the delivery of industry briefings and the most effective way to engage with local businesses. MRC advised that it is expected that the high level local procurement policies will be drafted by September 2018, with more detailed implementation methodology to be developed during October – December 2018. Environment: 1. MRC outlined that the issue in respect of Alpha Fine Chemicals was different to the MRC Graphite project – insofar as AFC's proposal was to develop downstream processing of nickel hydroxide utilising chemical processes on land situated adjacent to peri-urban development and within the catchment of the RAMSAR designated wetlands. The MRC project involved the extraction of graphite through open pit operations and purification of the product utilising a concentrator without the use of deleterious reagents. Further, MRC intends to provide comprehensive information to neighbouring landowners and the Munglinup community to ensure that they have a thorough understanding of the environmental processes and the work being undertaken by MRC, as well as have the opportunity to provide feedback and raise any concerns they may have. It is MRC's intention to be as open and transparent as it possibly can. Heritage: 1. MRC to brief the GEDC on potential aboriginal employment and business development opportunities as they arise. Other: Nil

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16-Jul-18	Meeting / Briefing	Office of Hon Peter Rundle MLA and Hon Colin De Grussa MLC	Social: 1. MRC advised that it was looking to adopt a proactive and positive influence on the communities in which it operated. It has a strong track record on making a social contribution – with the example given of the recent initiatives it had been adopting through its operations in South Africa. Economic: 1. MRC advised that there would be up to 63 residentially based workers. However, it was expected that these would mainly be based in Esperance. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). MRC was also currently assessing the possibility of a 5 day working week and daily bus-in/bus-out arrangements for most workers. There will still be a need for a 24/7 operation of the concentrator which will involve some night shift arrangements. 2. MRC advised that it was in the process of developing local procurement and employment policies and would liaise with the GEDC and ECCI. Environmental: 1. MRC outlined the substantial work which was currently underway in completing environmental background studies (inclusive of flora, fauna, subterranean and surface water etc). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. It is also expected that Community Information Sessions will be held in both Munglinup and Esperance in late August – these will include information about the environmental approval processes and the work being undertaken by MRC. MRC's aim was to be as thorough is possible in respect to the work being undertaken regarding the environmental approvals and was ensuring that the process was as transparent as possible. Heritage: 1. MRC advised that it had been in discussions with the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) and had undertaken heritage surveys with members of ETNTAC. Several sites of interest had already been identified. Future heritage survey work is planned in collaboration with ETNTAC and work is underway in developing a Cultural Heritage Management Plan which will set the protocols for current and ongoing management of heritage sites in accordance with State and Federal legislation. ETNTAC rangers have also been onsite monitoring clearing to ensure that no heritage sites are disturbed. MRC has also been in discussions with ETNTAC CEO to look at opportunities for future aboriginal employment and procurement	Social: 1. Ms Castledine noted the information provided. Economic: 1. Ms Castledine noted the information provided 2. Ms Castledine noted the information provided and advised that through her previous experience as CEO of the ECCI, it had been difficult for local businesses to secure significant business opportunities with mining interests in the past. Environmental: 1. Ms Castledine noted the information provided. Heritage: 1. Ms Castledine noted the information provided. Other: Nil	Social: 1. MRC is looking to complete its Community Engagement Plan in early August 2018, which will include a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Economic: 1. MRC will continue to look at a residentially based workforce for its direct employees, as well as those employed by contractors, as a first option. 2. MRC advised that it would work with the GEDC and ECCI on industry briefings and the most effective way to engage with local businesses. MRC advised that it is expected that the high level local procurement policies will be drafted by September 2018, with more detailed implementation methodology to be developed during October – December 2018. Environment: 1. MRC will ensure that the office of Mr Rundle and Mr De Grussa are provided with briefings on environmental activities and the progression of the approvals processes. Heritage: 1. No further action required. Other: Nil

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			of services. Other:		
17-Jul-18	Meeting / Briefing	Shire of Ravensthorpe	Social: 1. MRC advised that it was looking to adopt a proactive and positive influence on the communities in which it operated. It has a strong track record on making a social contribution. Economic: 1. MRC advised that there would be up to 63 residentially based workers. However, it was expected that these would mainly be based in Esperance. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). MRC was also currently assessing the possibility of a 5 day working week and daily bus-in/bus-out arrangements for most workers. There will still be a need for a 24/7 operation of the concentrator which will involve some night shift arrangements. 2. MRC advised that it was in the process of developing local procurement and employment policies and would liaise with the Ravensthorpe and Esperance Chambers of Commerce and Industry on conducting industry briefing sessions. Environmental: 1. MRC outlined the substantial work which was currently underway in completing environmental background studies (inclusive of flora, fauna, subterranean and surface water etc). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. Contingent on the completion of the Community Engagement Plan, it is also expected that Community Information Sessions will be held in both Munglinup and Esperance in late August – these will include information about the environmental approval processes and the work being undertaken by MRC. MRC's aim was to be as thorough is possible in respect to the work being undertaken regarding the environmental approvals and was ensuring that the process was as transparent as possible. Heritage: 1. MRC advised that it had been in discussions with the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) and had undertaken heritage surveys with members of ETNTAC. Several sites of interest had already been identified. Future heritage survey work is planned in collaboration with ETNTAC and work is underway in developing a Cultural Heritage Management Plan which will set the protocols for current and ongoing management of heritage sites in accordance with State and Federal legislation. ETNTAC rangers have also been onsite monitoring clearing to ensure that no heritage sites are disturbed.	Social: 1. No queries or concerns were raised in respect of social issues. Economic: 1. The Shire of Ravensthorpe queried whether the Project would look to have workers reside in either Ravensthorpe or Hopetoun – given that Hopetoun had a surplus of housing which had been constructed to cater for the Ravensthorpe Nickel Project. 2. The Shire noted the information provided and commented that their previous experience with both the Galaxy and First Quantum Minerals operations was that there had been minimal take up of local businesses - aside from sporadic contracting opportunities. The general observation is that businesses could not rely on long term contracts as these were often taken up by larger Perth based companies or suppliers. Environmental: 1. The Shire mentioned that there had been some issues related to the noise and visual impact of the Galaxy mine, given its close proximity to the township of Ravensthorpe. Heritage: 1. The Shire noted the information and advised that they saw no correlation in respect of the heritage and NT matters and their functions as a local government. Other: 1. The Shire advised that it had significant experience in the assessment and upgrade of Shire roads for use by mining companies – citing both Galaxy and First Quantum Minerals as examples. The Shire further advised that Mills Rd was already designated for heavy vehicle use for roads trains up to a maximum length of 36.5m, however these vehicles were restricted from using the road in wet weather.	Social: 1. MRC is currently developing a Community Engagement Plan which will be completed in early August 2018. It is expected that the Plan will include a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Economic: 1. MRC was open to workers residing in Munglinup – given the short travel distance to the mine site. However, there may not be sufficient numbers to warrant bussing arrangements to either Hopetoun or Ravensthorpe and personal travel would need to be considered in respect to OHS requirements for fatigue management etc. 2. MRC agreed that it was often difficult to obtain certain services which required specific skills or operational capacity that was not available or capable of being provided by local businesses – and it was often difficult for local businesses to invest in significant additional capacity or develop expertise in the absence of a long term contractual commitment by the mining company. Notwithstanding this, it was MRC's intent to work with both the GEDC and RRCI on holding industry briefings, as well as determine the best and most effective way to engage with local businesses in the region. MRC advised that it is expected that the high level local procurement policies will be drafted by September 2018, with more detailed implementation methodology to be developed during October – December 2018. Environment: 1. MRC advised that it intends to provide comprehensive information to neighbouring landowners and the Munglinup community to ensure that they have a thorough understanding of the environmental processes and the work being undertaken by MRC, as well as have the opportunity to provide feedback and raise any concerns they may have. It is MRC's intention to be as open and transparent as it possibly can. Heritage: 1. No further action required – other than to ensure that the Shire was briefed on heritage and native title matters that may have an impact on the local government. Other: 1. MRC requested a copy of the Shire's cadastral map defining the current road reserve and designation for heavy vehicle access.

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			Other: 1. MRC advised that it was yet to complete a logistics study – with the final export pathway being determined by the end destination of the product. In the event that the product was to be exported through the Port of Esperance, MRC were investigating the use of Farmers and Clayhole Rds for heavy vehicle access into and out of the mine site (road trains) – these roads all within the Shire of Esperance. MRC advised that it was considering the utilisation of Mills Rd (which falls within the Shire of Ravensthorpe) for light and emergency services vehicle access.		
25-Jul-18	Phone Call	Alistair Tucker	Woodman Environmental Consulting had requested access to the Tucker property immediately adjacent to the eastern boundary of the Mining Reserve in order to carry our flora survey work. Access was difficult inside the Reserve due to thick vegetation and the fire break having been grown over. The request was sent through at 5:00pmon the 25th July 2018, the day before access was required. Shayne Flanagan contacted Alistair Tucker by telephone at 5:30pm 25th July 2018. Mr Tucker advised that he was very uncomfortable about granting access to the farm at such short notice and without having a better understanding of the legal implications for them, and how that would play out down the track for future access. The issue was not pressed with Mr Tucker, given his reference to a previous incident where a contractor had sought to gain access to their property without the knowledge of MRCG.	Mr Tucker did query whether MRCG would be seeking to gain access through legal means, in the absence of any consent by the owners. The reason for his query was difficult to understand, other than he had assumed that the first option for MRCG was to pursue legal means of access in the event that access by the landowner was not granted.	Shayne Flanagan assured Mr Tucker that MRCG had adopted a 'good neighbour' policy and would always seek to come to an amicable agreement on any matters as this was always the best course of action if good relations and trust between the parties were to be established going forward. Mr Tucker advised that at this stage they would not be granting access. However, it was also agreed that we would arrange a follow up meeting during the week ending 4 August 2018, pending Mr Tucker's availability, to further discuss ways in which we can progress the access issue such that all parties are comfortable and satisfied with the arrangements.
30-Jul-18	Phone Call	Shire of Ravensthorpe	Social: 1. MRC advised that it was looking to adopt a proactive and positive influence on the communities in which it operated. It has a strong track record on making a social contribution. Economic: 1. MRC advised that there would be up to 63 residentially based workers. However, it was expected that these would mainly be based in Esperance. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). MRC was also currently assessing the possibility of a 5 day working week and daily bus-in/bus-out arrangements for most workers. There will still be a need for a 24/7 operation of the concentrator which will involve some night shift arrangements. 2. MRC advised that it was in the process of developing local procurement and employment policies and would liaise with the Ravensthorpe and Esperance Chambers of Commerce and Industry on conducting industry briefing sessions. Environmental: 1. MRC outlined the substantial work which was currently underway in completing environmental background studies	Social: 1. No queries or concerns were raised in respect of social issues. Economic: 1. The CEO queried whether the Project would look to have workers reside in either Ravensthorpe or Hopetoun – given that Hopetoun had a surplus of housing which had been constructed to cater for the Ravensthorpe Nickel Project. 2. The CEIO noted the information provided and commented that it would be beneficial to the district and local economy for local businesses to have the opportunity to have the opportunity to tender for work with MRC. Environmental: 1. As at the previous meeting with the Shire, the CEO mentioned that there had been some issues related to the noise and visual impact of the Galaxy mine, given its close proximity to the township of Ravensthorpe. Heritage: 1. The CEO noted the information provided. Other: 1. The CEO indicated that they could not see any issues with Mills	Social: 1. MRC is currently developing a Community Engagement Plan which will be completed in early August 2018. It is expected that the Plan will include a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Economic: 1. MRC was open to workers residing in Munglinup – given the short travel distance to the mine site. However, there may not be sufficient numbers to warrant bussing arrangements to either Hopetoun or Ravensthorpe and personal travel would need to be considered in respect to OHS requirements for fatigue management etc. MRC advised that it was their intention to work with both the GEDC and RRCI on holding industry briefings, as well as determine the best and most effective way to engage with local businesses in the region – such that they had to ability to bid for work. MRC advised that it is expected that the high level local procurement policies will be drafted by September 2018, with more detailed implementation methodology to be developed during

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			(inclusive of flora, fauna, subterranean and surface water etc). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. Contingent on the completion of the Community Engagement Plan, it is also expected that Community Information Sessions will be held in both Munglinup and Esperance in late August – these will include information about the environmental approval processes and the work being undertaken by MRC. MRC's aim was to be as thorough is possible in respect to the work being undertaken regarding the environmental approvals and was ensuring that the process was as transparent as possible. Heritage: 1. MRC advised that it had been in discussions with the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) and had undertaken heritage surveys with members of ETNTAC. Several sites of interest had already been identified. Future heritage survey work is planned in collaboration with ETNTAC and work is underway in developing a Cultural Heritage Management Plan which will set the protocols for current and ongoing management of heritage sites in accordance with State and Federal legislation. ETNTAC rangers have also been onsite monitoring clearing to ensure that no heritage sites are disturbed. Other: 1. Advised CEO that MRCG was currently evaluating options regarding access to the mine site. At this stage possible options were using Mills Rd/Reynolds Rd (Shire of Ravensthorpe) for light vehicle/emergency access, with heavy vehicle access along Farmers Rd/Clayhole Rd (Shire of Esperance).	Rd/ Reynolds Rd being utilised, contingent on any consequential upgrades and ongoing maintenance of the roads being financially underwritten by MRCG. The premise being that any upgrades or accelerated deterioration of the roads would be directly related to utilisation by the mining company. This will be a matter for further negotiation between the Shire and MRCG – and is not something I provided a position on. The CEO advised that the Shire could undertake the works, but would need confirmation of the specifications for the road that would be required (this would also be required to determine relevant alignment etc). The CEO also advised that the Shire (and more broadly Local Government) was having problems securing Native Vegetation Clearing Permits for road development/construction. The Shire currently prepares and submits the permits in-house. He advised that they would be very open to collaborating with MRCG on securing the clearing permits etc if they were necessary for any upgrades to Mills Rd. The CEO also advised that at the point where Reynolds Rd crosses to the eastern side of the Munglinup River, it is within the Shire of Esperance. He did not see that as an issue – given that the Shires of Ravensthorpe and Esperance currently have a resource sharing arrangement and there is a very good opportunity for collaboration. However, it would be a good idea to touch base the Esperance to ensure that they were aware of the possibility of upgrading Reynolds Rd.	October – December 2018. Environment: 1. MRC advised that it intends to provide comprehensive information to neighbouring landowners and the Munglinup community to ensure that they have a thorough understanding of the environmental processes and the work being undertaken by MRC, as well as have the opportunity to provide feedback and raise any concerns they may have. It is MRC's intention to be as open and transparent as it possibly can. Heritage: 1. No further action required – other than to ensure that the Shire was briefed on heritage and native title matters that may have an impact on the local government. Other: It was agreed that the Shire and MRC would conduct a site visit and assessment of Mills Rd to determine its suitability for light and emergency services vehicle all weather access – such that a determination could be made on whether any upgrade works were required. In the event that the road required upgrading, the Shire and MRC will enter into further discussions regarding Native Vegetation Clearing Permits and negotiations in respect the costs for upgrading and future maintenance.
2-Aug-18	Meeting / Briefing	Shire of Ravensthorpe	Shayne Flanagan met with the Ravensthorpe Shire Engineer and Manager Corporate Services specifically to discuss road access utilising Mills Rd for light and emergency services vehicle access:	• Travelled Road with Engineer between South Coast Hwy and Munglinup River (Shire Boundary); • Shire engineer advised that existing Rd design was suitable for vehicle traffic up to semi-trailer (with light vehicles having all weather access and truck access over 8tons being restricted during wet weather); • On that basis the Shire considered that no native vegetation clearing permit was required. • If road condition required improvement it would possibly involve re-sheeting and gradient/ drainage improvements which could be completed within the existing road envelope; • He advised that the Shire could undertake this work – most likely utilising contractors under their existing panel contractor arrangements within a timeframe agreed with MRCG, subject to any negotiated arrangements with the Shire. • The engineer also advised that if MRCG required development of Mills Road beyond its existing alignment or width, it would need to provide specifications of its requirements to the Shire.	The entry point from Mills Road into the mine reserve is via Reynold Rd, which falls within the Shire of Esperance. Shayne Flanagan to make contact with the Esperance Shire. The Shire of Ravensthorpe has already had an informal discussion, at officer level, with the Esperance Shire regarding road access to the mine site given that Mills Rd traverses both Shires. The Shire representatives advised that the Shire Council was receptive to working with MRC on whatever road upgrades may be deemed necessary by the company, however, in their view the road in its current configuration and condition was more than adequate to accommodate light and emergency vehicles, bearing in mind that it was already used by heavy vehicles up to 36.5m.

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3-Aug-18	Meeting / Briefing	Shire of Esperance	Shayne Flanagan met with the Esperance Shire (Richard Hindley, Manager Strategic Planning and Land Projects/ Neil Williams, Manager Engineering Development) regarding options MRCG were exploring for light and emergency services vehicle access into the Mining reserve utilising Reynolds Rd from its junction with Mills Rd.	The Esperance Shire advised that MRC should look at the option of the Shire transferring responsibility for the road to MRC, rather than the Shire having to work through a process of gaining native vegetation clearance permits and road development. In the event that this is not an option for MRC, the Shire advised that they would happily work in collaboration with MRC in respect of gaining the necessary approvals and work towards an agreement on the costs of upgrading and maintaining the road.	Matter referred to Daniel Hastings for consideration in respect of the transfer of the road from the Esperance Shire to MRC (Email dated 3 August 2018).
8-Aug-18	Meeting / Briefing	Shire of Esperance	Social: 1. MRC advised that it was looking to adopt a proactive and positive influence on the communities in which it operated. It has a strong track record on making a social contribution – with the example given of the recent initiatives it had been adopting through its operations in South Africa. Economic: 1. MRC advised that there would be up to 63 residentially based workers. However, it was expected that these would mainly be based in Esperance. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). MRC was also currently assessing the possibility of a 5 day working week and daily bus-in/bus-out arrangements for most workers. There will still be a need for a 24/7 operation of the concentrator which will involve some night shift arrangements. 2. MRC advised that it was in the process of developing local procurement and employment policies and would liaise with the Ravensthorpe and Esperance Chambers of Commerce and Industry on conducting industry briefing sessions. Environmental: 1. MRC outlined the substantial work which was currently underway in completing environmental background studies (inclusive of flora, fauna, subterranean and surface water etc). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. It is also expected that Community Information Sessions will be held in both Munglinup and Esperance in late August – these will include information about the environmental approval processes and the work being undertaken by MRC. MRC's aim was to be as thorough is possible in respect to the work being undertaken regarding the environmental approvals and was ensuring that the process was as transparent as possible. Heritage: 1. MRC advised that it had been in discussions with the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) and had undertaken heritage surveys with members of ETNTAC. Several sites of interest had already been identified. Future heritage survey	Social: 1. No queries or concerns were raised in respect of social issues. Economic: 1. Mr Scott welcomed the position that MRC was taking in respect of a residentially based workforce as a preferred option, given the economic benefits that would flow on for the town and district. He advised that there had been an outflow of people from Esperance with the cessation of iron ore exports through the port of Esperance, with over 100 jobs lost from the withdrawal of the Aurizon rail operations alone. 2. Mr Scott was receptive to the position taken by MRC in respect of local procurement – but was cautious in respect of the actual reality between having a policy and ensuring that local businesses were provided with a real opportunity to tender for work. Mr Scott cited previous examples of mining interests stating similar aspirations which have not translated to local businesses as a first option. Environmental: 1. Mr Scott made reference to the issues experienced by Alpha Fine Chemicals with respect to the location of its proposed nickel sulphate processing plant in Myrup and the reaction of the adjacent landowners. He thought that there may be a similar issue in Munglinup. 2. Mr Scott also queried the number of truck movements involved in exporting the product, in the event that it was to be exported through the Esperance Port. The query was raised on similar grounds to those raised by the Esperance Port in understanding the impact on the Esperance Port Access Corridor and any potential impacts on the Esperance community. Heritage: 1. Mr Scott noted the information provided and advised that the Shire was currently in negotiation with ETNTAC on land access issues. Other: 1. Mr Scott advised that he could see not see any issue with the utilisation of Farmers and Clayhole Rds for heavy vehicle access, contingent on agreement of the costs for upgrading and future maintenance, compliance with current road design rules for the vehicles that will be used, and ensuring minimal impact on existing road users and adjacent landowners (which would be managed by	Social: 1. MRC has recently completed a Community Engagement Plan, which includes a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Economic: 1. MRC will continue to look at a residentially based workforce for its direct employees, as well as those employed by contractors, as a first option. 2. MRC agreed that the devil will be in the detail in respect of the implementation of the policies and the extent to which there will be a preferential loading when it came to local businesses. It was MRC's intent to work with both the GEDC and ECCI on holding industry briefings, as well as determine the best and most effective way to engage with local businesses in the region. MRC advised that it is expected that the high level local procurement policies will be drafted by September 2018, with more detailed implementation methodology to be developed during October – December 2018. Environment: 1. MRC outlined that the issue in respect of Alpha Fine Chemicals was different to the MRC Graphite project – insofar as AFC's proposal was to develop downstream processing of nickel hydroxide utilising chemical processes on land situated adjacent to peri-urban development and within the catchment of the RAMSAR designated wetlands. The MRC project involved the extraction of graphite through open pit operations and purification of the product utilising a concentrator without the use of deleterious reagents. Further, MRC intends to provide comprehensive information to neighbouring landowners and the Munglinup community to ensure that they have a thorough understanding of the environmental processes and the work being undertaken by MRC, as well as have the opportunity to provide feedback and raise any concerns they may have. It is MRC's intention to be as open and transparent as it possibly can. 2. MRC outlined that it was looking at approximately 3-4 truck

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			work is planned in collaboration with ETNTAC and work is underway in developing a Cultural Heritage Management Plan which will set the protocols for current and ongoing management of heritage sites in accordance with State and Federal legislation. ETNTAC rangers have also been onsite monitoring clearing to ensure that no heritage sites are disturbed. MRC has also been in discussions with ETNTAC CEO to look at opportunities for future aboriginal employment and procurement of services. Other: 1. MRC advised that it was yet to complete a logistics study – with the final export pathway being determined by the end destination of the product. In the event that the product was to be exported through the Port of Esperance, MRC were investigating the use of Farmers and Clayhole Rds for heavy vehicle access into and out of the mine site (road trains). MRC had already been in discussions with Shire of Esperance officers at a preliminary level to ascertain current road designations (approval for road train use) and the protocols applied by the Shire for the upgrade and recurrent maintenance costs for roads. MRC outlined that it had also discussed the potential upgrade of the portion of Reynolds Rd that sat within the Shire of Esperance for utilisation by light and emergency services vehicles. Shire Officers had put forward a proposition for MRC to take on responsibility for the road, given that it is currently not a fully formed road and is not maintained by the Shire, and once the Project is operational its sole purpose would be to provide access to the mine site. MRC had advised that it would consider this option.	the Shire). Mr Scott also supported the proposal for the Shire to relinquish the portion of Reynolds Rd that was needed by MRC for access to the mine site, such that responsibility for the road's upgrade and ongoing maintenance would rest with MRC.	movements a day, given that the Project involved exporting 55,000 tonnes per annum. The Shire advised that the Esperance Port Access Corridor (EPAC) had recently been upgraded to accommodate a greater number of truck and rail movements – and that the additional truck movements related to the MRC Graphite project were minimal in the comparison to that which is already using the EPAC for the export of over 2.5 million tonnes of grain per annum through the port. MRC also advised that it was undertaking a logistics study to determine the most effective pathway to market and would brief the Shire once it had been completed. Heritage: 1. No further action required – other than to ensure that the Shire was briefed on heritage and native title matters that may have an impact on the local government. Other: 1. MRC to complete the logistics study to determine heavy vehicle configuration and number of truck movements, such that specifications for Farmers and Clayhole Rds could be determined. Upon completion of the logistics study, discussions with the Shire to recommence in respect of a possible audit of current road design and scope of work for any necessary upgrades. The matter of the transfer of Reynolds Rd by the Shire to MRC was referred to Daniel Hastings for consideration (Refer email 3 August 2018). It is advisable to consider that the portion of Reynolds Rd that sits outside the current Mining Reserve should remain a public road that MRC could consider taking responsibility only for the portion that sits within the Mining Reserve.
9-Aug-18	Meeting / Briefing	Esperance Chamber of Commerce and Industry	Social: 1. MRC advised that it was looking to adopt a proactive and positive influence on the communities in which it operated. It has a strong track record on making a social contribution – with the example given of the recent initiatives it had been adopting through its operations in South Africa. Economic: 1. MRC advised that there would be up to 63 residentially based workers. However, it was expected that these would mainly be based in Esperance. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). MRC was also currently assessing the possibility of a 5 day working week and daily bus-in/bus-out arrangements for most workers. There will still be a need for a 24/7 operation of the concentrator which will involve some night shift arrangements.	Social: 1. Ms Ryan enquired on whether MRC would be open to providing direct sponsorship support for ECCI or ECCI events. Ms Ryan provided a copy of the ECCU sponsorship package and membership application. Economic: 1. Ms Ryan advised that the ECCI was very supportive and a keen advocate for the utilisation of a residentially based workforce – especially in the context of the broader economic benefits this could deliver to the town and local businesses. Ms Ryan advised that there had been an exodus of families from Esperance due to the cessation of iron ore exports through the port of Esperance, with over 100 jobs lost from the withdrawal of the Aurizon rail operations alone. This has had a significant impact on local business, as well as local schools and community organisations. 2. MS Ryan advised that the ECCI would be open to working with	Social: 1. MRC has recently completed a Community Engagement Plan, which includes a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Ms Ryan was advised that MRC would consider sponsoring arrangements once it had achieved project approval and in the context of MRC Board approved sponsoring arrangements. It was confirmed that MRC was already a member of the ECCI. Economic: 1. MRC will continue to look at a residentially based workforce for its direct employees, as well as those employed by contractors, as a first option. 2. MRC agreed that the devil will be in the detail in respect of the

Date	Type of Engagement	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback	Response to Feedback / Outcomes / Comments
			2. MRC advised that it was in the process of developing local procurement and employment policies and would liaise with the GEDC and ECCI. Environmental: 1. MRC outlined the substantial work which was currently underway in completing environmental background studies (inclusive of flora, fauna, subterranean and surface water etc). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. It is also expected that Community Information Sessions will be held in both Munglinup and Esperance in late August – these will include information about the environmental approval processes and the work being undertaken by MRC. MRC's aim was to be as thorough is possible in respect to the work being undertaken regarding the environmental approvals and was ensuring that the process was as transparent as possible. Heritage: 1. MRC advised that it had been in discussions with the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) and had undertaken heritage surveys with members of ETNTAC. Several sites of interest had already been identified. Future heritage survey work is planned in collaboration with ETNTAC and work is underway in developing a Cultural Heritage Management Plan which will set the protocols for current and ongoing management of heritage sites in accordance with State and Federal legislation. ETNTAC rangers have also been onsite monitoring clearing to ensure that no heritage sites are disturbed. MRC has also been in discussions with ETNTAC CEO to look at opportunities for future aboriginal employment and procurement of services. Other: Nil	MRC on industry briefings and assisting with any opportunities for MRC to engage effectively with local businesses. Ms Ryan, raised similar issues as had been raised by the Esperance Shire, insofar as the past experiences where mining interest had stated similar intentions which had not translated to local businesses deriving a significant benefit due to a preference to utilise larger Perth based businesses. Environmental: 1. Ms Ryan noted the information provided and ECCI advised that there had been some sensitivity in the community regarding potential environmental impacts and that this would need to be managed carefully given the recent experience with Alpha Fine Chemicals. Heritage: 1. Ms Ryan noted the information provided and advised that practical engagement with ETNTAC on commercial and contracting opportunities were seen as a positive step – however emphasising the need for any engagement to be underpinned by sustainable business methodology. Other: Nil	implementation of the policies and the extent to which there will be a preferential loading when it came to local businesses. It was MRC's intent to work with both the GEDC and ECCI on holding industry briefings, as well as determine the best and most effective way to engage with local businesses in the region. MRC advised that it is expected that the high level local procurement policies will be drafted by September 2018, with more detailed implementation methodology to be developed during October – December 2018. Environment: 1. MRC outlined that the issue in respect of Alpha Fine Chemicals was different to the MRC Graphite project – insofar as AFC's proposal was to develop downstream processing of nickel hydroxide utilising chemical processes on land situated adjacent to peri-urban development and within the catchment of the RAMSAR designated wetlands. The MRC project involved the extraction of graphite through open pit operations and purification of the product utilising a concentrator without the use of deleterious reagents. Further, MRC intends to provide comprehensive information to neighbouring landowners and the Munglinup community to ensure that they have a thorough understanding of the environmental processes and the work being undertaken by MRC, as well as have the opportunity to provide feedback and raise any concerns they may have. It is MRC's intention to be as open and transparent as it possibly can. Heritage: 1. No further action required. Other: Nil
10-Aug-18	Meeting / Briefing	Member of Government	Social: 1. MRC advised that it was looking to adopt a proactive and positive influence on the communities in which it operated. It has a strong track record on making a social contribution – with the example given of the recent initiatives it had been adopting through its operations in South Africa. Economic: 1. MRC advised that there would be up to 63 residentially based workers. However, it was expected that these would mainly be based in Esperance. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). MRC was also currently assessing the possibility of a 5 day working	Social: 1. Mr Rundle raised no questions regarding the information that was provided. Economic: 1. Mr Rundle noted the information provided and advised that he had been a keen advocate for residentially based workforces rather than FiFo. 2. Mr Rundle noted the information provided and advocated that MRC work with the GEDC and local chambers of commerce in investigating ways to engage with the local business community. Environmental: 1. Mr Rundle noted the information provided and raised no queries	Social: 1. MRC completed a Community Engagement Plan in early August 2018, which includes a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Economic: 1. As has already been stated, MRC will look at a residentially based workforce for its direct employees, as well as those employed by contractors, as a first option. 2. Industry briefing sessions are set out as a requirement of the Community Engagement Plan. It is planned to liaise with the

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			week and daily bus-in/bus-out arrangements for most workers. There will still be a need for a 24/7 operation of the concentrator which will involve some night shift arrangements. MRC was open to workers residing in Munglinup – given the short travel distance to the mine site. 2. MRC advised that it was in the process of developing local procurement and employment policies and would liaise with the Ravensthorpe and Esperance Chambers of Commerce and Industry on conducting industry briefing sessions. Environmental: 1. MRC provided an overview of the work which was currently underway in completing environmental background studies (inclusive of flora, fauna, subterranean and surface water etc.). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. It is also expected that Community Information Sessions will be held in both Munglinup and Esperance (date to be determined) – it is expected that there will be information provided about the environmental approval processes and the work being undertaken by MRC at the proposed Sessions. MRC's aim was to be as thorough is possible in respect to the work being undertaken regarding the environmental approvals and was ensuring that the process was as transparent as possible. Heritage: 1. MRC advised that it had been in discussions with the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) and had undertaken heritage surveys with members of ETNTAC. Several sites of interest had already been identified. Future heritage survey work is planned in collaboration with ETNTAC and work is underway in developing a Cultural Heritage Management Plan which will set the protocols for current and ongoing management of heritage sites in accordance with State and Federal legislation. ETNTAC rangers have also been onsite monitoring clearing to ensure that no heritage sites are disturbed. MRC has also been in discussions with ETNTAC CEO to look at opportunities for future aboriginal employment and procurement of services. Other: 1. MRC advised that it was yet to complete a logistics study – with the final export pathway being determined by the end destination of the product. In the event that the product was to be exported to overseas markets, it was likely that it would be trucked from the mine site to Esperance Port. Given the low volumes of approx. 55,000 tonnes per year it was expected that truck movements would not be more than 3-4 a day. Mr Graham was also advised of MRC's recent discussions with the Local Governments about road access.	other than the sensitivities that may be raised by local landowners – making special note of minimising the impact on adjacent farming operations. Heritage: 1. Mr Rundle noted the information provided and advised that he had also been in discussions with ETNTAC on the potential for commercial and employment opportunities related to the MRC Project. Other: 1. Mr Rundle noted the information provided – making the comment that any additional utilisation of the Esperance Port would be beneficial to the Esperance economy and community given the recent cessation of iron ore exports through the port and the impact that this had on both the Port and Esperance economy. 2. Mr Rundle advised that he had recently met with the Premier, Mark McGowan and had raised the prospect of downstream processing - emphasising the point that graphite, along with lithium, nickel and cobalt were critical to the future production of batteries. Mr Rundle made the comment that the current dialogue in the battery technology space seemed to be dominated by lithium – and the conversation broadened to include the other commodities	Goldfields Esperance Development Commission and Esperance and Ravensthorpe Chambers of Commerce such that any local sourcing strategies by MRC are complimentary to work being undertaken by these organisations. It is expected that the high level local procurement policies will be drafted by September 2018, with more detailed implementation methodology to be undertaken during October – December 2018. Environment: 1. MRC advised that it would keep Mr Rundle informed of the environmental processes and advise when approvals had been referred to the relevant statutory authorities for consideration. Further, MRC intends to provide comprehensive information to neighbouring landowners and the Munglinup community to ensure that they have a thorough understanding of the environmental processes and the work being undertaken by MRC, as well as have the opportunity to provide feedback and raise any concerns they may have. It is MRC's intention to be as open and transparent as it possibly can. Heritage: 1. MRC undertook to keep Mr Rundle informed of the heritage work being undertaken and progression of commercial and employment opportunities with ETNTAC. Other: 1. No further action 2. Liaison with State Government on down—stream processing opportunities currently being pursued by MRC Head Office.

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			2. Discussions also covered issues related to opportunities for downstream processing, and the need for the State Government to be proactive in addressing the issues of regulatory approvals, the availability of suitable land and planning approvals/infrastructure to facilitate investment decisions by private sector in value adding/downstream processing opportunities.		
10-Aug-18	Meeting / Briefing	Southern Ports Authority	Social: 1. MRC advised that it was looking to adopt a proactive and positive influence on the communities in which it operated. It has a strong track record on making a social contribution – with the example given of the recent initiatives it had been adopting through its operations in South Africa. MRC advised that it had recently completed a Community Engagement Plan, which includes a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Economic: 1. MRC advised that there would be up to 63 residentially based workers - most likely base in Esperance – with the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). MRC also advised that the projected timing of the project (contingent on securing the necessary environmental approvals and completion of a bankable feasibility study) was the commencement of operations in the last quarter 2019. Environmental: 1. MRC outlined the substantial work which was currently underway in completing environmental background studies (inclusive of flora, fauna, subterranean and surface water etc). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. It is also expected that Community Information Sessions will be held in both Munglinup and Esperance in late August – these will include information about the environmental approval processes and the work being undertaken by MRC. MRC's aim was to be as thorough is possible in respect to the work being undertaken regarding the environmental approvals and was ensuring that the process was as transparent as possible. 2. MRC advised that it was likely that the product would be in the form of a concentrate and exported in bulka bags (possibly packed inside 20 foot containers). However, this would be contingent on completion of offtake agreements and a logistics study. Heritage:	Social: 1. The Port raised no queries related to social issues – given that the meeting was focussed on providing them with an understanding of the nature of the project, timelines for approvals and operations and potential throughput for the Port Economic: 1. Mr Byers expressed an interest in the approach being adopted by MRC – insofar as pursuing the option of a residentially based workforce given the recent round of redundancies at the Esperance Port, with the expectation of more redundancies in September 2018. With the additional loss of approximately 100 jobs from the rail operator (due to cessation of iron ore exports) there may be an opportunity for Port workers (with transferrable skills) to find employment with MRC. This would be good for retention of workers and their families in the town of Esperance. Environmental: 1. Mr Byers noted the information provided. 2. Mr Byers advised that the Port could see no issue in the product being exported in the proposed form, however, it would be advisable to inform the Port of the final method proposed for export as soon as it is known, such that it could ensure compliance with its environmental licences. As a general rule, the export of product in fully enclosed bulka bags or containers represent little or no issues in respect of the Port licences, and it was only where product was exported as bulk concentrate directly into a ship's hold utilising bulk outloading processes that there were more significant licensing and community impact considerations. 3. The Port queried how many truck movements would be involved – in the context of the impact on the Esperance Port Access Corridor and local residents. The Port advised that $120m had recently been spent on upgrading the EPAC to improve truck and rail efficiency into the port, and to remove any interface with local residential traffic through grade separation. Significant work had also been undertaken in respect of noise amelioration with bunding and noise screen walls constructed. The Esperance Town Planning Scheme had also been amended to include a noise buffer zone to ensure any building development had appropriate noise reduction materials used in their construction. Heritage: 1. Mr Byers noted the information.	Social: 1. No further action required – other than incorporating social elements in overall future briefings. Economic: 2. MRC will continue to look at a residentially based workforce for its direct employees, as well as those employed by contractors, as a first option. MRC had already received expressions of interest from Port employees who had either been made redundant or were looking at the potential of taking up future redundancy options. These expressions had been forwarded to MRC HR Department for future reference. There is a minimum timing difference of over 12 months between the Port redundancies in June and September 2018 and the potential commencement of operations of the Project in Q4 2019. This may diminish the opportunity for take up of redundant Port employees as they may have already secured employment elsewhere. MRC will continue to liaise with the Port on any employment opportunities presented by the Project. Environment: 1. No further action required – other than incorporating an update on the environmental processes and associated timelines in overall future briefings. 2. MRC will provide information on the proposed method for export to the Port as soon as it has been finalised. 3. MRC outlined that it was looking at approximately 3-4 truck movements a day, given that the Project involved exporting 55,000 tonnes per annum. The Shire advised that the Esperance Port Access Corridor (EPAC) had recently been upgraded to accommodate a greater number of truck and rail movements – and that the additional truck movements related to the MRC Graphite project were minimal in the comparison to that which is already using the EPAC for the export of over 2.5 million tonnes of grain per annum through the port. MRC also advised that it was undertaking a logistics study to determine the most effective pathway to market and would brief the Port once it had been completed.

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			1. MRC advised that it had been in discussions with the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) and had undertaken heritage surveys with members of ETNTAC. Several sites of interest had already been identified. Future heritage survey work is planned in collaboration with ETNTAC and work is underway in developing a Cultural Heritage Management Plan which will set the protocols for current and ongoing management of heritage sites in accordance with State and Federal legislation. ETNTAC rangers have also been onsite monitoring clearing to ensure that no heritage sites are disturbed. MRC has also been in discussions with ETNTAC CEO to look at opportunities for future aboriginal employment and procurement of services. Other: Nil	Other: Nil	Heritage: 1. No further action required. Other: Nil
14-Aug-18	Phone call/ Email	Landowners/ Community members	Shayne Flanagan made contact by telephone to make introduction and explain details of the Community Information Session being held in Munglinup on the 20th August 2018. Personal invitation to the Community Information Session was then sent by email.	All had a rudimentary knowledge of the Project. and advised that they were very keen to learn more about the Project. All were provided with contact details for the Senior Social Responsibility Adviser and were advised that a one-on-one meeting and briefing could be arranged at their convenience if they were not able to attend the Community Information Session.	Rudimentary knowledge of project - follow-up to be undertaken if unable to attend the Community Information Session at Munglinup
20-Aug-18	Community Event	Landowners/ Community members	Attendees: • Landowners (adjoining Mining Reserve 27414) • Adjacent Landowners (neighbouring farms) • Local Community o Residents of the townsite of Munglinup o Members of the Munglinup Community Group o Members of the Munglinup Farmers Group • Local business owners • Local Government (Shire of Ravensthorpe) The Community Information Session was publicised by: • direct invitations to local landowners and community groups via email and telephone calls; • banners posted at the local general store/roadhouse and caravan park; • Via the membership networks of the Munglinup Community Group and Munglinup Farmers Group (includes all local sporting groups); • Esperance Express newspaper website (13 August 2018); • Community broadcasts on local radio (Triple M Radio 747) throughout the week leading up to the session; and • The Shire of Ravensthorpe Community Facebook page The Community Information Session was attended by 30 people with all attendees given the opportunity to provide their telephone and email contact details should they wish to receive more information about the Project throughout its development. This information was entered into the Munglinup Local Community Contact Register.	Social: 1. Emergency Services – concern was raised by local St John's Ambulance volunteer on whether the mine-site would be relying on the local Munglinup St John's Ambulance service for medical emergencies – thereby creating the potential for the community to be without an ambulance service while it catering to the mine. Economic: 1. Local contracting – a query was raised on whether there would be local sourcing of contractors. The premise of the question was along the lines of ensuring that there was a direct economic benefit to the local community. 2. Potential for Apprenticeships – a query was raised on whether there would be any apprenticeships or training opportunities for young people. Environmental: 1. Tailings dam construction – a query was raised about whether the tailings dam would be PVC lined and what steps would be taken to ensure that tailings would not be released into the Munglinup River Catchment. Heritage: No queries were raised in respect of Native Title or heritage matters. Other: 1. Access Roads – a query was raised on what local roads were to be	Social: 1. MRC recognises the concerns of the community and would more than likely opt for having its own emergency services vehicles onsite, such that there would be no impact on the community in the event of either a medical for natural emergency. It was intended that the mine site, once operational, would have suitably trained personnel and clear protocols to manage a medical or natural emergency. MRC would also look to work with the community in exploring opportunities where it can support existing volunteer emergency and medical service providers. Economic: 1. MRC intention is to utilise as much local content as possible – bearing in mind it is subject to the requirements of the ASX and needs to ensure best value for money. As set out in the presentation, MRC intends to work with the Goldfields Esperance Development Commission (State Government) and local Chambers of Commerce (ECCI, RRCI) to hold industry briefings and explore the best ways to engage with local businesses to maximise opportunities. 2. At this stage, a final structure of the workforce has not been determined. In the event that trade based positions are required, and the circumstances are consistent with the efficient and economic operation of the mine, MRC would look to explore training opportunities for young people looking to enter the workforce.

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			The Session was conducted in an informal interactive way, with attendees invited to ask questions during a power point presentation. The presentation set out information about the following: • Mineral Commodities Ltd – a general overview of the company and the legal entity through which the Munglinup Graphite Project is being developed. • An overview of the Project, inclusive of o Extraction and processing methodology; o Projected mine life and tonnages to be mined and processed; o Proposed heavy and light vehicle access routes; o Environmental and heritage approval process, including: § Relevant legislation (Federal and State); § Relevant licences and permits; § Timeline and outline of background studies across all environmental categories. o Overall timelines for the Project. • Community Engagement, including: o Projected employment and economic impact for the project; o Industry engagement strategies; o Future community engagement activities; and o Key contact details.	used for mine access and the potential number of truck movements on South Coast Hwy.	Environment: 1. The attendees were advised that the intent was to utilise the existing topography of the site to assist with construction of the tailing dam. Utilisation of existing ridge lines would form the dam walls on three sides, with the lower western side constructed of mining waste material. It was intended to clay line the bottom of the dam (including ridge lines), with PVC lining of the constructed western dam wall. However, further work was required to ensure that clay lining would be sufficient. Heritage: Nil Other: 1. As set out in the presentation. MRC is currently liaising with the Shires of Ravensthorpe and Esperance on accessing local roads to gain entry into the mine site utilising the local road network. The expectation is that any heavy vehicle access will utilise roads on which road trains already operate (for grain and fertiliser cartage). MRC is acutely aware of the need to ensure any roads on which it operates are upgraded and maintained to acceptable standards, such that safety of road users and the ongoing operations of adjacent farms are not adversely impacted. MRC is also currently liaising with Main Roads WA (Goldfields Esperance Regional Office) regarding its intentions to operate vehicles up to a maximum length of 36.5m (current RAV level for the region). Total and daily truck movements and vehicle GCM will be determined upon the completion of a Logistics Study.
21-Aug-18	Community Event	Community members, Key Stakeholders, Local Govt, interest and industry Groups	Attendees: • Local Community o Residents of the townsite of Esperance o Members of service clubs • Local business owners • Local Government (Shire of Esperance) • Industry and Interest Groups • Members of Government • Government Agencies The Community Information Session was publicised by: • direct invitations to local government, members of government, members of industry and interest groups via email and telephone calls; • banners posted on community bulletin boards at local shopping centres • Via the membership networks of the local Rotary and Lions Clubs; • Esperance Express newspaper website (13 August 2018); • Community broadcasts on local radio (Triple M Radio 747) throughout the week leading up to the session; and • The Shire of Esperance Community Facebook page The Community Information Session was attended by 35 people with all attendees given the opportunity to provide their telephone and email contact details should they wish to receive more	There were no questions raised during the presentation itself. After some prompting, several attendees raised queries regarding the project timelines and project process. Some comments were made about the positive effects the project could have on the Esperance community and economy.	General community feedback was positive, with a degree of optimism on the opportunities that could be delivered to the local community and economy. One local interest group, Local Environmental Action Forum requested further information regarding the environmental background studies which were currently being undertaken as part of the environmental approval process (requested during one-on-one conversation after conclusion of the presentation). An undertaking was given to provide the information subject to approval by MRC.

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			information about the Project throughout its development. This information was entered into the Key Stakeholder Community Contact Register. The Session was conducted in an informal interactive way, with attendees invited to ask questions during a power point presentation. The presentation set out information about the following: • Mineral Commodities Ltd – a general overview of the company and the legal entity through which the Munglinup Graphite Project is being developed. • An overview of the Project, inclusive of o Extraction and processing methodology; o Projected mine life and tonnages to be mined and processed; o Proposed heavy and light vehicle access routes; o Environmental and heritage approval process, including: § Relevant legislation (Federal and State); § Relevant licences and permits; § Timeline and outline of background studies across all environmental categories. o Overall timelines for the Project. • Community Engagement, including: o Projected employment and economic impact for the project; o Industry engagement strategies; o Future community engagement activities; and o Key contact details.		
27-Aug-18	Phone Call/Meeting	Main Roads WA	Shayne Flanagan contacted Shane Power to outline the options currently being considered by MRC Graphite for light and heavy vehicle access to the mine site. A map indicating the proposed access roads was provided by follow-up email. Mr Power was advised that it was probable that product would be transported by trucks up to a length of 36.5m, with configuration and GCM to be confirmed pending the completion of a logistics study. He was advised that it is estimated that a total of 56,000 tonnes a year will be exported over a 9 year mine life (which is expected to increase depending on further exploration). As yet it hasn't been determined whether the product will be shipped from Esperance port or trucked directly to Kwinana.	Main Roads advised that heavy vehicles had been approved for use on both Farmers Rd and South Coast Hwy under the National Heavy Vehicle Scheme up to the classification N7.2 (Tandem Drive Heavy Vehicles up to 36.5m). Notwithstanding that, he advised that the intersection between Farmers Rd and South Coast Hwy would need to be audited to confirm that it complies with the current standards applied by Main Roads for N7.2 Classification vehicles. Main Road's policy is that any new user would be required to pay for the required upgrade of the intersection if it is found to be non-compliant, irrespective of it already being approved for restricted access vehicle use. This will be a matter for negotiation between MRC Graphite and the State.	Mr Power was advised that further information would be provided upon completion of the logistics study by MRC Graphite.
12-Sep-18	Meeting / Briefing	Esperance Tjaltjraak Native Title Aboriginal Corporation	Social: Nil Economic: 1. MRC enquired on the progress of ETNTAC's Economic Opportunity Plan (EOP), as it would be logical to engage with ETNTAC once it had considered the EOP and had a greater degree of clarity on how it was looking to position the organization to take up commercial opportunities in both the immediate and longer terms. MRC advised that it was open to engaging with ETNTAC throughout this process and will ensure that ETNTAC are fulling briefed on critical development milestones of the Project, as well as any identified commercial/contracting opportunities that may arise	Social: Nil Economic: 1. Peter Bednall referenced the discussions that had occurred with Daniel Hastings and Mark Caruso regarding commercial/economic opportunities that could be available to ETNTAC - in the form of the potential for native seed collection and nursery services to provide tube stock for rehabilitation, as well as contracted transport services. (Refer meeting 18 April 2018 Mark Caruso/Daniel Hastings). He advised that ETNTAC had not yet completed its EOP (KPMG have been engaged to develop the plan which was initially due for completion in June 2018). He Advised that ETNTAC would look to engage with MRC about	Social: Nil Economic: 1. ETNTAC will provide MRC with a copy of its EOP once it had been finalised, following which MRC will work with ETNTAC to identify near term opportunities and those that require further development of ETNTAC commercial capacity and operating capability. It is expected that the EOP would be in draft form by October 2018. Environment: 1. MRC advised that it would keep Mr Bednall informed of the environmental processes and advise when approvals had been

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			which align with their EOP. Environmental: 1. MRC provided an overview of the work which was currently underway in completing environmental background studies (inclusive of flora, fauna, subterranean and surface water etc.). It is estimated that MRC will be in a position to submit its environmental approvals (State and Federal) in October 2018. Heritage: 1. MRC enquired on whether ETNTAC had any issues with the recent heritage work and site visits that had been undertaken – in terms of access, outcomes and ongoing collaboration. 2. MRC advised that it had completed a draft Cultural Heritage Management Plan, which was currently under internal review prior to being sent to ETNTAC for consideration. The intent of the Plan was to ensure that all parties were operating with complete transparency and understanding on the roles and responsibilities of all parties. Other: Nil	prospective commercial opportunities once they had completed the EOP and assessed near term opportunities aligned with existing capability, as well as longer term opportunities which would require investment in the development of capability and capacity. He advised that any opportunities would need to be commercially sustainable. Environmental: 1. Mr Bednall provided no comment on the environmental processes. Heritage: 1. Peter Bednall advised that there did not appear to be any issues and that all parties were working well together in good faith. However, he did suggest that it would be advisable to document the actions or agreed outcomes at the end of each site visit to ensure there was no confusion or ambiguity on the part of either party. 2. Peter Bednall advised that he had the opportunity to review the draft Table of Contents for the Plan and believed the Plan would set a good foundation for MRC and ETNTAC to work together on Cultural and Heritage matters. Other: Nil	referred to the relevant statutory authorities for consideration. MRC also advised Mr Bednall that it would keep ETNTAC informed of any economic opportunities that may be available through the environmental approval processes, as well as those that may arise as a result of obligations that the environmental authorities may place on MRC as a result of the environmental processes. Heritage: 1. Matter referred to Belinda Bastow and Dan Ball for consideration. It is understood that a draft document had been developed and this would be forwarded to ETNTAC for consideration prior to the next site visit. 2. Cultural Heritage Plan to be forwarded to ETNTAC for their review prior to the end of September 2018 Other: Nil
21-Sep-18	Meeting / Briefing	Department of Mines, Industry Regulation & Safety	The purpose of this meeting was to discuss the content and submission of two Programmes of Work that Integrate Sustainability have submitted on behalf of MRC Graphite. Ryan Hepworth from DMIRS, at the time of the meeting, was in the process of reviewing the information provided with the applications. Ryan asked for additional information relating to the applications, in particular the Threatened Ecological Community, so that he could progress their approval. The discussion covered POW76241 on additional sumps and pads, POW76073 and the eastern access track and POW74373 on drilling in the north of M74/245.	POW76241 – There was some confusion around where pads and sumps had already been approved and where additional pads and sumps were being requested POW76073 – There was concern regarding the lack of vegetation mapping on the eastern side of the mining reserve where the proposed eastern access track would extend. Confirmation requested on the extent of the TEC on this side and if it would be impacted. POW74373 – Updated TEC mapping shows that a large drilling polygon which has already been approved covers an extent of the TEC in the north of M74/245. Confirmation requested regarding if this activity has commenced and/or will proceed and notification that a clearing permit is required for the clearing of the TEC.	POW76241 – Review the information provided by MRC Graphite and update the POW if required. POW76073 – Provision of an updated report by Woodman Environmental which covers the extent of the TEC on the eastern side. The access track does pass through the TEC and will require a clearing permit to proceed as it is classed as an Environmentally Sensitive Area. Further information on the extent of the TEC to be requested from Woodman Environmental. The possibility of using the existing firebreak as the road corridor was suggested which could utilise the clearing exemptions, further information is required to confirm if this is a viable option. To allow the POW to be processed the best way forward is to resubmit the POW with the eastern access track removed so that the other activities can be assessed and approved. The eastern access track can be resubmitted as a separate POW at a later date. POW76253 has been submitted to cover the activities minus the access road. POW74373 – Clearing of the TEC requires a clearing permit. Discussion that sterilisation drilling in this northern polygon is no longer required by MRC due to the identification of the TEC in this area. DMIRS requested written confirmation that this was the case and the TEC would not be cleared.
27-Sep-18	Meeting / Briefing	Member of Government	Social: 1. MRC provided an update on the community engagement activities it had undertaken during the past three months, inclusive of the Community Information Sessions that had been held in Munglinup and Esperance on the 20th and 21st August 2018, respectively.	Social: 1. Mr Graham raised no questions regarding the information that was provided. Economic: 1. Mr Graham enquired on whether it was possible to employ	Social: 1. Nil Economic: 1. MRC advised that it had already received informal expressions of interest from several current and recently redundant Esperance

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			Economic: 1. As had been outlined previously, MRC emphasised that its preference was to employ a residentially based workforce – which is estimated to be approximately 63 employees. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). 2. MRC advised that it was keen to engage with the State Government on the potential for downstream processing, in the context of the Lithium and Energy Materials Strategy currently under development. Comment was made on the need to ensure that proper consideration was given to graphite as a key ingredient in battery technology, alongside lithium, cobalt and nickel. Environmental: 1. MRC provided an update on the environmental approval process and the extensive work that has been undertaken. He was advised that MRC were currently undertaking a spring survey of flora and would soon be commencing a water bore program to further investigate the subterranean hydrology of the site, as well as undertaken further water sampling. Mr Graham was advised that MRC was still on track to submit its environmental approvals (State and Federal) in October 2018. Heritage: 1. MRC advised that it had been in discussions with ETNTAC and had continues to undertake heritage surveys with members of ETNTAC. Several sites of interest had already been identified. 2. Mr Graham was also advised that MRC had engaged with ETNTAC in good faith in respect of potential economic and commercial opportunities for Traditional Owners. He was advised that MRC had offered to review ETNTAC draft Economic Opportunity Strategy once it had been completed – such that potential near term opportunities could be identified based on existing capability and capacity, as well as longer term opportunities that would require a more sophisticated business approach. Other: 1. MRC advised that it had recently engaged a consultant to undertake a logistics study. MRC had also engaged with Main Roads WA and the Shires of Esperance and Ravensthorpe in respect of road access into the mine site. It was highlighted that a substantial portion of the roads under consideration were already designated as heavy vehicle routes – with two roads (Clayhole and Reynolds Rds) within the Shire of Esperance requiring upgrade and reclassification for road train use.	workers that had recently been made redundant at the Port of Esperance – as he believed that they would have transferrable skills and would avoid the necessity for them to move away from Esperance. 2. Mr Graham advised that he would ensure that graphite, and specifically the Munglinup Graphite Project, were given appropriate consideration - he would highlight the project in his next meeting with the Premier. Environmental: 1. Mr Graham raised no queries in respect of the information provided on the environmental approval processes being undertaken by MRC. Heritage: 1. Mr Graham raised no queries with respect to heritage survey matters. 2. Mr Graham made the observation that there was no obligation on MRC with respect to employment or commercial arrangements – given that Native Title had been extinguished and a land access agreement had not been entered into. On that basis he applauded the approach being taken by MRC in working with ETNTAC on potential economic and commercial opportunities. Other: 1. Mr Graham noted the information provided.	Port employees. The issue was the time lag between the most recent round of redundancies (September 2018) and the potential start-up of operations of the Project (Q4 2019). 2. Nil Environment: 1. MRC advised that it would keep Mr Graham informed of the environmental processes and advise when approvals had been referred to the relevant statutory authorities for consideration. Heritage: 1. MRC undertook to keep Mr Graham informed of the heritage work being undertaken. 2. MRC undertook to keep Mr Graham informed of any economic or commercial opportunities identified between MRC and ETNTAC. Other: 1. No further action

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05-Oct-18	Meeting / Briefing	ETNTAC	Social: Nil Economic: 1. MRC enquired on the progress of ETNTAC's Economic Opportunity Plan (EOP), as it would be logical to engage with ETNTAC once it had considered the EOP and had a greater degree of clarity on how it was looking to position the organization to take up commercial opportunities in both the immediate and longer terms. As discusses with ETNTAC CEO, Peter Bednall on the 12th September 2018, MRC is open to engaging with ETNTAC throughout this process and working with ETNTAC to identify commercial/contracting opportunities that may arise which align with their EOP. Environmental: Nil Heritage: Nil Other: Nil	Social: Nil Economic: 1. Nicky Sudmeyer provided a preliminary draft EOP that had been developed by KPMG. She advised that her focus was to work through the identified opportunities in the EOP and provide a briefing to the ETNTAC Board on what opportunities could be achieved in the immediate future. She advised that the Board were keen to progress the opportunities that had been identified as a result of earlier discussions with Daniel Hastings and Mark Caruso – as these had been included as high priority opportunities in the Plan. In confidence, Ms Sudmeyer expressed concern that the Board seemed overly ambitious about what ETNTAC could achieve in the short term, given their lack of commercial and business capacity as an organisation. Environmental: Nil Heritage: Nil Other: Nil	Social: Nil Economic: 1. On reviewing the draft EOP, it is apparent that KPMG has undertaken a rudimentary desktop analysis of the current demographic and economic profile of the Esperance region (based on data from the ABS, Local Government Authority and GEDC), with little detailed 'on the ground' investigation or analysis. In setting out their suggested economic opportunities, it is clear that they have simply relied on information provided by ETNTAC, with particular reference to the opportunities that may arise through commercial/contracting arrangements with MRC. Initial feedback provided to ETNTAC on the EOP essentially focussed on the need for the identified economic opportunities to be supported by an analysis of the current capability and capacity of ETNTAC as a service provider – as well as a roadmap to guiding the organisation on developing its inherent business capabilities. In the absence of this, it would be difficult for ETNTAC to be competitive against other service providers or operate as a commercially sustainable business. It was suggested that ETNTAC look at adding this to the EOP, such that the Board could be well informed on the work needed to develop their organisation in alignment with their economic opportunity aspirations. Environment: Nil Heritage: Nil Other: Nil
08-Oct-18	Presentation	Esperance Rotary Club	Social: Refer PPT Presentation and general presentation outline. Economic: Refer PPT Presentation and general presentation outline. Environmental: Refer PPT Presentation and general presentation outline. Heritage: Refer PPT Presentation and general presentation outline. Other: Nil	Social: 1. A query was raised by the President of the Esperance Agricultural Society on whether MRC would look at providing funding or sponsorship to local community groups. Economic: 1. Local contracting – a query was raised on whether there would be local sourcing of contractors and whether local businesses would have an opportunity to provide services – especially during the construction phase of the Project. 2. Members welcomed the approach by MRC to look at a residentially based workforce as its preferred option – rather than FiFo. There was commentary about the tight economic times being endured by the local economy and the need for additional job opportunities to both retain and attract people to the region. Environmental:	Social: 1. MRC completed a Community Engagement Plan in early August 2018, which includes a strategy on social engagement and potential opportunities for community sponsorship or partnering. It is likely that this will be contingent on the Project approval - with scoping of potential opportunities to be undertaken in alignment with project approval decision timelines. Economic: 1. MRC intention is to utilise as much local content as possible – bearing in mind it is subject to the requirements of the ASX and needs to ensure best value for money. As set out in the presentation, MRC intends to work with the Goldfields Esperance Development Commission (State Government) and local Chambers of Commerce (ECCI, RRCI) to hold industry briefings and explore the best ways to engage with local businesses to maximise opportunities.

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				1. There were no queries or comments raised about the environmental elements of the Project. Heritage: No queries were raised in respect of Native Title or heritage matters. Other: 1. Access Roads – a query was raised on what local roads were to be used for mine access and the potential upgrade of the intersection between Farmers Rd and n South Coast Hwy.	2. As has already been stated, MRC will look at a residentially based workforce for its direct employees, as well as those employed by contractors, as a first option. Environment: 1. Nil Heritage: 1. Nil Other: 1. MRC is currently liaising with Main Roads WA (Goldfields Esperance Regional Office) regarding its intentions to operate vehicles up to a maximum length of 36.5m (current RAV level for the region). Once a decision has been made on the heavy vehicle configuration Main Roads will undertake an audit of the intersection to ensure that it complies with current design standards.
08-Oct-18	Meeting / Briefing	Southern Ports Authority	Social: Nil Economic: Nil Environmental: MRC advised that it had engaged Latitude Management and Development (Dave Hewson) to undertake a Logistics Study, to inform the environmental approval submissions, as well as provide MRC with options in respect of the transport logistics options available to it to export its product to the world market. MRC advised that it was likely that the product would be in the form of a concentrate and exported in bulka bags (possibly packed inside 20 foot containers). However, this would be contingent on completion of offtake agreements and the logistics study. Heritage: Nil Other: Dave Hewson outlined the work that he had been engaged to undertake – related to investigating the best options for the export of the MRC product. He advised that this early stage, MRC had indicated a preference for exporting the product in either bulk bags, or bulka bags enclosed in containers. Mr Hewson set out a range of scenarios, primarily: 1. Transport bulka bags by truck directly from mine site to Port. This would require access to undercover storage for the period of time necessary to accumulate the bulka bags required for a shipment.	Social: Nil Economic: Nil Environmental: Mr Bates advised that as a result of recent regulatory work undertaken by the Port, it had streamlined the processes through which additional products could be added to its licence issued under the EPA Act. What used to take up to 18 months to complete, could now by achieved in 28 days. Mr Bates could see no issues with the export of graphite through the Esperance Port, especially as a packaged product in either Bulka Bags or containers. He advised that the export of Graphite had been discussed at the Port Consultative Committee and there had been no issues raised by members (The PCC is comprised of community members, environmental groups, ECCI, Shire and local members of government). Heritage: Nil Other: Mr Bates advised that the Port could accommodated either bulka bags or containers, however, in its experience it has found that export using containers seems to be a more practical and efficient method. In respect of the options under consideration he advised: 1. There is currently adequate undercover storage space at the port, but this could change in the event that FQM recommences exports through the Port – which is a possibility in mid-2019. This could also be a relatively expensive options given that it would require leasing of port facilities and more man-power relative to containers.	Social: Nil Economic: Nil Environment: MRC requested a copy of the Southern Ports Authority – Environmental Approval Guide for New Clients and the Self-Assessment Decision Making Flowchart, such that it could ensure that all requirements are well understood and that the necessary processes are able to be commenced when required. Heritage: Nil Other: Dave Hewson advised that he would summarise the information provided and would revert once he had discussed the various options and their relative merits with MRC. He acknowledged that it would be a good idea to engage with the Port as early as possible in respect securing the necessary environmental licensing approvals.

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			2. Transport bulk bags by truck from mine site to storage facility within Esperance town site and campaign load once ship has docked. 3. Transport bulka bags directly from mine site to Port and load into containers at the Port. This would require access to storage at the port and container loading capability. 4. Transport bulka bags to storage facility within Esperance town site and load into containers which would then be transported to the Port and stored awaiting shipment.	2. This is a possible option and would avoid the need for certainty around long term access to undercover storage at the port. The Port has significant experience with campaign loading and has the traffic management and port access processes to ensure that this can be done successfully with negligible delays to ship loading. 3. Advised that this has similar issues to option 1 related to long term access to undercover storage for bulka bags and container loading within the Port. Advised that the Port could easily managing container out-loading. 4. Advised that this is the Port's preferred option, as it simply involves the Port facilitating the export of containers. It has substantial capacity for container storage which would allow for consolidation of shipments at the Port. He did not recommend campaign loading of containers – given the potential delays in administration of accepting enclosed containers at the port.	
10-Oct-18	Meeting / Briefing	Member of Government	Social: 1. MRC provided an update on the community engagement activities it had undertaken during the past three months, inclusive of the Community Information Sessions that had been held in Munglinup and Esperance on the 20th and 21st August 2018, respectively. Economic: 1. MRC emphasised that its preference was to employ a residentially based workforce – which is estimated to be approximately 63 employees. There was also the possibility of a further 47 additional employees required to undertake mining operations (likely to be a contract mining arrangement). 2. MRC advised that it was exploring the feasibility of downstream processing, in the context of the Lithium and Energy Materials Strategy currently under development by the WA State Government. MRC also advised of the large potential for graphite in the development of new technology – related to the adoption of graphene. Environmental: 1. MRC provided an update on the environmental approval process and the extensive work that has been undertaken. MRC is currently undertaking a spring survey of flora and has commenced a water bore program to further investigate the subterranean hydrology of the site, as well as undertaken further water sampling. MRC were looking to submit its environmental referrals (State and Federal) in late October 2018. Heritage: 1. MRC advised that it engaged extensively with the Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC) through 2018 and continues to undertake heritage surveys with members of ETNTAC. Several sites of interest had already been identified. 2. MRC advised that it continues to work collaboratively with	Social: 1. Mr Wilson raised no questions regarding the information that was provided. Economic: 1. Mr Wilson welcomed the approach by MRC, given the tight economic environment in the district, with the recent closure of several businesses in Esperance. 2. Mr Wilson provided generic commentary on the issues related to Australian mineral development and the failure of previous governments and industry to adequately create pathways for value add and downstream processing. Environmental: 1. Mr Wilson noted the information provided and made reference to the need to engage as early in the process as possible with the Department of Environment and Energy (Cth). Heritage: 1. Mr Wilson raised no queries with respect to heritage matters. 2. Mr Wilson advised that sustainable and commercially sound economic development opportunities, whilst a noble aspiration, were historically difficult to achieve. Mr Wilson acknowledged the approach being taken by MRC with its early and comprehensive engagement. Other:	Social: 1. Nil Economic: 1. MRC advised that it had already received informal expressions of interest from several current and recently redundant Esperance Port employees. 2. MRC advised that more had to be done by both the State and Federal Governments to de-risk private investment and create investment pathways. Environment: 1. MRC advised that it was meeting with DoEE representatives on the 11th October 2018 to provide an update on the project and gain a clearer detailed understanding of the specific requirements the DoEE would require in terms of the referrals. Heritage: 1. MRC undertook to keep Mr Wilson informed of the heritage work being undertaken. 2. MRC undertook to keep Mr Wilson informed of any economic or commercial opportunities identified between MRC and ETNTAC. Other: Nil

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			ETNTAC good faith in respect of potential economic and commercial opportunities for Traditional Owners. MRC had offered to review ETNTAC draft Economic Opportunity Strategy once it had been completed – such that potential near term opportunities could be identified based on existing capability and capacity, as well as longer term opportunities that would require a more sophisticated business approach. Other: Nil		
11-Oct-18	Meeting / Briefing	EPA Services	The purpose of the meeting was to discuss the referral of the Munglinup Graphite Project under the *EP Act*. Over the course of the meeting ISPL provided an overview of the Project and the environmental matters. EPA Services provided information on their expectations and the level of detail they would like to see within the referral document. The following matters were discussed: • Overview of the Munglinup Graphite Project including the company, the location, current site layout. • A solar plant is being considered for power to the site which would be located to the south of the processing plant. It was commented that the Department of Jobs, Tourism, Science and Innovation may be worth contacting regarding the battery market, funding and offsets. • Discussion was had around the transport of the end product form the site to the Esperance port by truck with the product contained in bulka bags. • Overview of the baseline surveys which have been completed to date and a brief overview of the results of the surveys. o The focus on flora and fauna surveys has been to address the gaps from the 2015 survey. o Information on Native Title in the area and that MRC has been working with the Esperance Nyungars. o Work is currently underway to understand the groundwater aspects at the site. Currently all groundwater is likely to be sourced onsite for use within the plant. o Flora and vegetation work have been completed to define habitat for underground orchid and the TEC. These will be avoided wherever possible. o Fauna surveys and additional targeted threatened species habitat mapping has been undertaken. • Potential need for emergency discharge to the Munglinup River was highlighted.	• The EPA raised concerns about the management of tailings and kerosene in the tails. • The EPA raised the question regarding how well the bulka bags will contain the product? The EPA indicated that the logistics and containment of the product should be considered and clearly explained, even if the product is not hazardous, because of the history surrounding the Esperance Port. • The EPA indicated that they would like to see detailed evidence of consultation with the Esperance Nyungars around the Project including their opinions and consent of the project. • The EPA raised the question surrounding GDE's including subterranean and terrestrial. • The EPA raised questions regarding the scenarios under which discharge to the river may be required. ISPL indicated further work was required to understand this aspect. The EPA requested that a reasonable approach should be developed and put forward for assessment if required. This aspect is likely to also come under Part 5 approvals if needed. • The EPA raised the point that from a legal perspective if the TEC is within the development envelope it will be considered as being cleared even if it is not within the disturbance envelope. • The comment was made that State listed TECs may require an offset. • The EPA outlined that where Carnaby Habitat is present the best option is to follow the guidance provided by DoEE on which guidelines to use. DBCA will be consulted during the process regarding this species. • The EPA stated that if we are also referring to DOEE it would be wise to state this in the referral document and to highlight the preferred accredited process. • Offsets may be required if the project is assessed at EPA or EPBC level and it would be wise to begin considering this early and starting the discussion with the right people. • It would be worth examining this project from a Holistic Impact Assessment to encompass the TEC, Carnaby's and other species • The EPA indicated that the pathway of the project through the EIA process may be influenced by the level of community input and interest, input and consultation with other departments and specialists like DBCA, as well as the decision by DoEE. • The EPA indicated that if there is uncertainty regarding any of the studies or factors such as new species, additional information would be required and this may mean additional surveys. • The EPA suggested that the pathway might be an Assessment on Referred Information with the possibility of requesting for	• It was provided that the TSF would be a lined facility and further analysis of the tailing's material is currently underway. • ISPL provided that the geology is not suitable for subterranean fauna and that terrestrial GDEs are currently being examined. • The comment was made that the development envelope could be adjusted to remove more of the TEC.

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				additional details to complete the assessment. • The EPA did highlight that due to Christmas, shutdowns and workload they may not be able to meet a December deadline on a decision.	
11-Oct-18	Meeting / Briefing	DoEE (Cth)	The purpose of the meeting was to discuss the referral of the Munglinup Graphite Project under the *EPBC Act*. Over the course of the meeting ISPL provided an overview of the Project including the matters of national environmental significance. DoEE provided information on their expectations and the level of detail they would like to see within the referral document. The following matter were discussed: • Overview of the Munglinup Graphite Project including the company, the location, current site layout. • Overview of the baseline surveys which have been completed to date. The focus on flora and fauna surveys has been to address the gaps from the 2015 survey. Brief overviews of the results of the surveys was provided. • Each matter of national environmental significance (MNES) was discussed including the Underground Orchid, Kwongkan Shrubland TEC, Carnaby's Cockatoo, Malleefowl, Chuditch.	• DoEE raised the question about work which has been completed for the underground orchid and indicated that in the referral there should be detailed commentary around the reasons why there is unlikely to be a population within the area. • DoEE indicated that the notes provided show that the Draft guidelines have been used. They said that these guidelines should not be used for surveys as they have not been signed off. Rather the current guidelines from 2012 should be used for the survey and to assess habitat. • DoEE indicated that of particular importance is foraging habitat within 12km of known breeding and roosting sites. They would like to see this information in the referral document with maps and text descriptions. • DoEE indicated the Birdlife Australia, DBCA, WAM or Tony Kirkby would be worth contacting to determine known roosting and breeding sites in the region. • DoEE indicated that the referral must include clarity on the hectares to be cleared of the TEC and how the TEC interacts with the project. They also would like to see detailed maps of the TEC extent. • DoEE said that the referral must clearly explain the habitat and why it is or is not currently suitable for Malleefowl and if it could be again in the future. • DoEE indicated that the referral must clearly explain and define the habitat characteristics and outline why or why not the Chuditch is likely to be present. • DoEE would like to see updated maps within the referral which show the habitat over the disturbance footprint. • DoEE would like to clearly see the hectares of clearing of habitat for each MNES. • DoEE would like the referral to consider the regional context including the presenting maps of threatened species records form a regional perspective. • The supporting document should indicate that the process preferred is an accredited process with the EPA. • Offsets should not be considered in the referral but DoEE indicated that offsets may be relevant if this is deemed a controlled action. • DoEE mentioned that the referral should also consider the indirect impacts to MNES during construction and operational phases. • DoEE recommend presenting the worst-case scenario in the referral to assess, e.g. The maximum amount of clearing. • DoEE indicated that currently statutory timelines are not being met and to expect delays on the decision. Submitting in October may not have a response by Christmas.	• ISPL provided a summary of the Underground Orchid habitat and why there is unlikely to be a population in the area. • ISPL indicated that the fauna report would be updated to reflect the current Guidelines. • ISPL will update the referral document to address the comments raised by the DoEE.

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23-Oct-18	Meeting / Briefing	Munglinup Community	Social: MRC reaffirmed its preference to employ a residentially based workforce, predominantly based in Esperance. It was reiterated that there would be the facility for people to reside in Munglinup, however due to the shortage of housing this may provide difficult – as MRC were not planning on purchasing or constructing housing in the Munglinup townsite. Economic: MRC advised that it had been utilising local contractors where possible – citing examples such as the local earthmoving contractors, roadhouse, fuel supplies and meals for site contractors. Advised that this serves to reinforce MRC's commitment to utilising local content where practicable. Environmental: MRC provided a further outline of the work that had been undertaken during the August Community Information Session. This has included completion of the spring flora survey and commencement of water boring and hydrological testing. MRC advised that is had met with EPA and DoEE personnel to clarify their requirements prior to the submission of the Project approvals – possible in late October/early November. Heritage: MRC advised that it had been working collaboratively with ETNTAC on conducting heritage surveys during August and September, as well as providing ETNTAC with a draft Cultural Heritage Management Plan for consideration such that all parties had a joint understanding and agreement on how heritage matters would be managed during the development, construction and operation of the Project. Reference was made to the Section 5 application which had been lodged under the Aboriginal Heritage Act 1972, for inclusion of the Munglinup River and its tributaries as a sacred site. Other: MRC provided further information about the discussions that had been held with the Shires of Ravensthorpe and Esperance and Main Roads WA regarding road access to the Site. As had been outlined at the August Community Information Session, the intent was to utilise Mills Rd (Shire of Ravensthorpe) for light and emergency service vehicle access. Clayhole and Farmers Rd (Shire of Esperance) would be used for heavy vehicle access. All roads would need to be audited to ensure that they complied with current design standards for heavy vehicles (Category 7 36.5m road trains) inclusive of the intersection of Farmers Rd and South Coast Hwy.	Social: The Shire of Ravensthorpe (CEO) advised that other mining companies in the region had found it difficult to source residentially based workers and that MRC may need to consider alternate options for sourcing its employees. They saw the main impediment being the 100km road trip to and from Esperance which would add 2.5hours to each working day. They suggested MRC consider the construction of a mining camp in Munglinup where workers could reside during their work week and travel back to Esperance to be with their families when they are not rostered. The Shire also advised that this option should be placed on the table ASAP given the difficulty of accessing land and the long lead times in the establishment of services etc. Most land that had been identified for future development is classified as State Reserve and subject to Native Title, which would add to the complexity of access. Economic: Community members noted that local contractors where currently being utilised and the positive impact this was having on the community. Environmental: Community members noted the information provided – especially with respect to the hydrology work that was being undertaken. As had been raised at the August Community Information Session, the construction and integrity of the tailings dam was raised – especially in respect of the material that would be used to line the dam, as well as strategies to manage high rainfall events which could lead to the dam overtopping and the contents of the dam being discharged into the environment (and ultimately into the Munglinup River. Heritage: Local landowners advised that they had received notification of the Application as their farms were affected - given that tributaries ran through their properties. Several had lodged submissions on their own right. There was general acceptance of the need to respect and safeguard sacred sites and areas of significance in respect of Aboriginal cultural and heritage – however the main area of concern was the nature under which the application had been lodged, the fact that the application had not been submitted through ETNTAC and the absence of any consultation on discussions with local land owners by the parties that lodged the application. Other: Community members noted the information provided.	Social: MRC advised that it would consider the information provided by the Shire in its planning phase for the Project – as regards strategies to attract and retain residentially based workers as a first preference – especially when weighed against the added costs and complexity of developing a workers camp in Munglinup. Economic: MRC intention is to utilise as much local content as possible – bearing in mind it is subject to the requirements of the ASX and needs to ensure best value for money. As set out in the presentation, MRC intends to work with the Goldfields Esperance Development Commission (State Government) and local Chambers of Commerce (ECCI, RRCI) to hold industry briefings and explore the best ways to engage with local businesses to maximise opportunities. Environment: The attendees were advised that the intent was to utilise the existing topography of the site to assist with construction of the tailing dam. Utilisation of existing ridge lines would form the dam walls on three sides, with the lower western side constructed of mining waste material. Lining of the dam was still being investigated. The scenario of managing high rainfall events and the potential for overtopping of the dam was also being worked through as part of the design process for the dam, as well as being dealt with in the environmental approval process. Heritage: MRC advised that it had lodged a submission in respect of the Mining Reserve and had been liaising directly with ETNTAC on the matter – given that they are the Prescribed Body Corporate and recognised representatives of the Esperance Nyungar People under the 2015 Native Title Determination. MRC emphasised the constructive and collaborative working relationship it had established with ETNTAC and that it was necessary to be respectful of Aboriginal heritage and to ensure due process was followed. MRC advised local landowners that if they had any concerns regarding native title or heritage matters, the first point of contact should be ETNTAC. MRC was cognisant of not providing advice or direction to the local community or landowners on matters of aboriginal heritage or the Act. Other: MRC would ensure that the local community and landowners are kept updated on road access and the potential level of truck movements that will take place during construction and operation of the Project.
20-Nov-18	Meeting/Briefing	DPLH	The purpose of this meeting with the Department of Planning, Lands and Heritage was to discuss the registered heritage site at Munglinup and the other identified heritage values to determine the best way forward for MRC in line with the Aboriginal Heritage Act.	A status update was requested on the assessment of one of the heritage finds submitted to DPLH – Mungan Wilgie Koort. DPLH advised that the paperwork relating to the submission of this site had been received however it had not been assessed yet.	On the 21st of November DPLH followed up with ISPL to discuss the documents sent after the meeting. DPLH advised that the Registrar was not comfortable with the recommendation in the joint letter signed from MRC and ETNTAC. The reasoning being that the wording of the letter was inconsistent

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			ISPL provided an overview of the Munglinup Graphite Project including the location of the Project and a brief description of the proposed activities. An overview of the heritage surveys completed to date was provided including the heritage features and values which had been identified within the area. A number of maps were presented to support this and show the locations of heritage values in relation to the site layout. DPLH have also been provided with a copy of the Heritage Survey Report completed by AAA Consultants. Belinda highlighted that throughout the survey process the Esperance Nyungars have been involved and consulted. ISPL highlighted that it is not the intention of MRC to impact on this site and a buffer has been placed around the site. ISPL provided some background information relating to the submission of paperwork on the boundaries of this site, namely that there was previous agreement with the TOs that the tributaries would not be included. ISPL highlighted that a second letter was sent to DPLH addressed form MRC and the Esperance Nyungars relating to the tributaries and the agreement that the tributaries on M74/245 were not as significant as the river and requested the registered site be amended to remove these. An additional question was raised by ISPL relating to the other isolated heritage finds and artefact scatters that were recorded during the heritage surveys on M74/245, in particular what the best approach is for MRC given that these cannot be avoided.	DPLH advised that if the buffer is the same as what has been lodged, which it is, then this would not change should the heritage place be assessed and identified as registered. It was also indicated that places classified as "Other Heritage Place are a combination of places yet to be assessed and assessed places that were found not to meet the definition of the registered site and do not require further management. DPLH advised that the boundaries and descriptions in the paperwork that was submitted specifically included the tributaries and this is what was assessed and registered. Post the ACMC review DPLH has been requested to revise the length of the tributaries within M74/245. The tributaries will be remapped just to the bed and banks of the river and tributaries. DPLH did not recall receiving this letter. DPLH advised that with the letter and agreed conversation records and the survey report the registered site could be amended. It was acknowledged that this did not include the tributaries on E74/565 and that additional heritage survey work was required on this side of the mining reserve. Should clarity on the eastern drainage lines be reached after further work, it could also be possible to amend the registered site boundary with agreed conversations and letters form MRC and the Esperance Nyungars. DPLH advised that the only way to have true clarity over the status and legal risks associated with this material is to submit the finds and scatters to be assessed as sites under the Aboriginal Heritage Act. This process will determine if they are or are not sites and if section 18 clearance is needed. DPLH highlighted that it comes down to risk and the agreement with the aboriginal group. It was highlighted that a cultural heritage management plan has been signed off by the Esperance Nyungars and DPLH requested to see a copy of this document. DPLH also indicated that they would provide further context relating to what defined 'isolated sites' as to whether one submission of all the finds would be appropriate or if they need to be submitted individually. DPLH advised that section 18 clearances can take between 3-6 months to process.	with the AAA report in saying that only two tributaries were of lesser importance, but the other tributaries were to remain as a registered site. DPLH advised that the registered site boundaries would be unlikely to change based on this letter and that a Section 18 clearance would be required to interact with the tributaries within M74/245 and E74/565. DPLH confirmed that the submitted site Mungan Wilgie Koort was not appearing on the public spatial layers and AHIS online tool. They indicated that this would be updated, and the place should appear on the 'Other Heritage Places' layer by tomorrow. DPLH provided information on the other isolated artefacts and finds from the AAA report and survey. It was suggested that the best way to manage these is to submit a HIS form to have these assessed as a site. The HIS form can include all of the scatters and finds within the area and this would be processed as one site. DPLH provided input on the process for a Section 18 clearance stating that Section 18 does not just apply to areas where you know there are heritage values but can also apply to areas where it is believed there is a strong likelihood that there will be material. DPLH indicated that the best option would be to submit the Section 18 forms covering all of M74/245 and the section of E74/565 within the Mining Reserve, even if these are outside of current survey areas. This approach is based on the assumption that material will likely be present in unsurveyed areas and be similar to the material already recorded. DPLH also indicated that the TO may want heritage monitors involved in any track and road clearing activities where no surveys have been undertaken to date.
18-Jan-19	Phone Call Received	Dep Planning Lands and Heritage – Heritage Operations	ISPL received a phone call from Aidan Ash at DPLH who is the assessing officer of the Munglinup Section 18 Application. Aidan was calling to discuss the application. Items that were discussed included: Tenure and names on the application. It was highlighted that the declarant names needed to align with the proponent and landowner. Aidan suggested that to address this a new application would need to be submitted with the names updated. Land Ownership. Section 18 Notices are attached to the landowner, in this application this would be the tenement holder. As the application boundary submitted covered several different types of land parcels including road reserves evidence of land ownership would need to be provided in the application. If this was not a tenement holder, such as the road reserve, consent would need to be provided by the vested party. To reduce the	There were several issues with the Section 18 application originally submitted in December 2018. These included the declarant names, evidence of land ownership and boundary of the application.	Re-submission of the Section 18 application to address the issues identified by the assessing officer at DPLH.

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			complexity associated with this it was suggested to resubmit the application with an amended boundary which focuses solely on Mining Act tenure held by MRC Graphite. To support the application, it was highlighted that the tenement holder information extracted from Mineral Titles Online should be attached to the application. Mining Reserve. As the tenure and Section 18 application boundary co-exist with the Mining reserve R24714 that is vested in DMIRS it was highlighted that DPLH would require a letter or other notification from DMIRS that they are aware of the project. Areas outside heritage survey boundaries. The original boundary submitted included areas within E74/565 which had not been the focus of a heritage survey and which the TOs had not commented on in relation to heritage matters. After internal discussions at DPLH regarding this, Aidan advised that the Registrar was not comfortable to progress this application without view of the TOs on areas which had not been surveyed. It was suggested to resubmit the application with a reduced boundary focusing on the areas which had been the subject of a heritage survey (M74/245)		
21-Jan-19	Phone Call Received	Dept Mines, Industry Regulation and Safety	ISPL sent an email to DMIRS regarding the Section 18 application and Mining Reserve R24714. The email discussed the request from DPLH to provide written notification that DMIRS is aware of the project on R24214. ISPL requested that a representative from DMIRS provide written notification that the Department is aware of the Munglinup Graphite Project and is not objected to activities occurring on R74214.	Request from DPLH to provide written notification that DMIRS is aware of the Munglinup Graphite Project on Mining Reserve R24214 to support the Section 18 application	DMIRS working through the process to provide the required information.
10-Jun-19	Meeting/Briefing	DWER, EPA Services	On the 10th June 2019 ISPL and the assessing officers from DWER EPA Services for the Munglinup Graphite Project had a phone conversation to discuss a potential application for preliminary works relating to the centreline for the Eastern Access Road. The purpose of the discussion was to provide an overview of the potential activities planned, to raise awareness of issues relating to environmental values and progressing other approvals. ISPL provided DWER with detailed maps and a description of the potential works associated with the eastern access road centreline. The centreline is necessary to progress with heritage and geotechnical surveys on the eastern side of the Project area. DWER raised concerns on the environmental values the potential works would intersect including the Kwongkan Shrubland TEC, Carnaby Cockatoo foraging habitat and fragmentation. They indicated that these works would impact on key elements to the assessment which could impact on the application being approved. During the course of the conversation it was determined that the activities were more aligned to investigative work rather than preliminary work. Three options were identified which could reduce impacts to environmental values. These being: 1. Determine alternative access points to enter the area and complete heritage surveys 2. Wait for the formal EPA assessment of the Project to be completed and then undertake these works and heritage surveys pending the outcome of the decision	DWER provided advice on how to complete the s41 application and the information that they require to be included in the application, should MRC wish to progress down a pathway of submitting the s41 application to progress with a portion of the centreline. Environmental/Sustainability and environment - ISPL provided maps of the proposed works associated with the Eastern Access Centreline and where these intersected with environmental values. Environmental/Approvals - The conversation was around the potential submission of a s41 application for preliminary works associated with the Project. These works being a centreline to allow for heritage surveys and geotechnical work along the eastern access road. Heritage/Approvals - Investigative work would not remove the requirement to gain section 18 heritage approval	Environmental/Sustainability and environment - DWER provided suggestions on alternative options to progress with the centreline. Suggesting that impacts to these values at this stage would not be appropriate as the Project is being formally assessed. Environmental/Approvals - DWER provided three alternative options for progressing with the approvals associated with the centreline and the information that should be included should MRC progress with an application. Heritage/Approvals - Working with the TOs will be vital to reach an agreement on how the investigative works may be implemented.

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			3. Submit a s41 application for investigative work which covers only the bottom of the centreline and does not intersect with environmental or heritage values		
19-Jun-19	Meeting/Briefing	DWER, EPA Services	On the 19th June 2019 ISPL and the assessing officers from DoEE for the Munglinup Graphite Project had a phone conversation to discuss the proposed investigative works relating to the centreline for a short extent of the Eastern Access Road to allow for heritage surveys to be completed (activity extent from processing plant footprint to the Munglinup River heritage site on E74/565). The purpose of the discussion was to provide an overview of the potential activities planned, provide a reasoning of the potential activities and to discuss potential options to progress with this work in relation to federal environmental approvals. ISPL provided DoEE with detailed maps and a description of the potential works associated with this section of the eastern access road centreline. ISPL also outlined the necessity of this work to allow for heritage surveys to be completed to obtain state heritage approvals in a timely manner. ISPL also provided DoEE with an overview of the discussion had with DWER regarding this work and State environmental approvals. DoEE presented three options relating to this work: 1. Do not complete the work and wait until environmental approval has been granted. 2. Lodge a variation to the referral accepting that this would mean the State and Federal agencies are no longer assessing the same project and it would not be assessed through the accredited process. Rather this may mean developing an impact assessment document for DoEE. 3. Submit this proposed work as a new referral activity. This would remove it from the current assessment underway. This pathway could be risky and influence the outcomes relating to potential offsets. As an outcome form the discussion, DoEE will contact DWER to discuss the proposed works and the best way to proceed.	Environmental/Sustainability and environment - ISPL provided maps of the proposed works associated with the short section of the Eastern Access Corridor Environmental/Approvals - The conversation was around the federal approvals required and the process involved in undertaking the works associated with clearing for the section of the Eastern Access Corridor Heritage/Approvals - Investigative work would not remove the requirement to gain section 18 heritage approval.	Environmental/Sustainability and environment - DoEE provided suggestions on pathways / possibilities for this work to occur in relation to their approval process Environmental/Approvals - DoEE provided three possible options as pathways to progress. DoEE also indicated that they would discuss this matter with DWER and provide feedback. Heritage/Approvals - Working with the TOs will be vital to reach an agreement on how the investigative works may be implemented.
16-Jul-19	Meeting/Briefing	DWER, EPA Services	On Friday 12th of July DWER provided ISPL with a letter outlining the additional information required for the assessment of Munglinup Graphite Project. A phone meeting between ISPL and DWER EPA Services Unit was held on the 16th of July 2019 to further discuss the comments and queries from the letter. The following items were discussed: Expectations for Response to Additional Information Required Two options were provided as an appropriate way to address the letter: • Provide a stand-alone document that addresses the queries along with the additional survey reports and studies completed. • Update the Referral Supporting Information document to address the queries and provide the additional survey reports and studies completed. Inland Waters Refinement of the information provided to date is required. This includes outlining the water supply source, a water balance,		

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			refining discussion on groundwater dependent ecosystems and outlining impacts to the Munglinup River. Flora & Vegetation Some additional flora and vegetation work is required. This includes survey work for the Sedge Conostylis, context on regional distribution of vegetation units and *Phytophthora* Dieback. It was recommended to develop targeted discussion points and questions related to flora and vegetation to have at a meeting with the Threatened Ecosystems Branch later in July that will assist in scoping the additional work. Terrestrial Fauna The EPA must be able to definitively say that the work meets their guidance material. To do this additional work is required. This includes a Level 2 Terrestrial Fauna Survey that can demonstrate threatened species presence and if habitat is (or is not) conducive to the threatened species. Additional work relating to SRE fauna may be required. It was recommended to develop targeted discussion points and questions related to fauna and SRE fauna to have at a meeting with the Threatened Ecosystems Branch later in July that will assist in scoping the additional work.		
18-Jul-19	Meeting/Briefing	DPLH	A phone conversation between Aidan Ash, Belinda Bastow & Sophie Monaco on 18/7/19 at 9:45am relating to changes identified to the registered site boundary of the Munglinup River. These changes appear to have happened in the last couple of months. A map made in January uses data that shows only the original buffer around the Munglinup River. The current public data has a big block across the whole Munglinup River and its tributaries. The boundary change appears to be linked to a change in status. The site now appears to have a restricted file and the knowledge holder names have been removed. The new shape is a random computer-generated block which is designed to mask the location of the actual site boundary because of the 'restricted' status. It appears that the restricted status arose from a HIS form that was re-submitted in August 2018 with the box ticked to indicate that the data was to be restricted. This form was re-submitted by David Guifole. The actual boundary of the registered site has not changed. This new block boundary now appears in the public domain data. To gain authorisation to interact with this site now the boundary visually covers the whole project area: • Need permission form the knowledge holders to obtain the site boundary location; or • Submit spatial data of planned activities to DPLH and they will check and advise if the activities interact with the site or not and whether activities should be moved.	Heritage/Heritage and Native Title - The registered site boundaries of the Munglinup River have changed on the public data	Heritage/Heritage and Native Title - The actual boundary of the registered site has not changed. This new block boundary now appears in the public domain data.

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22-Nov-19	Meeting/Briefing	ETNTAC	Esperance Nyungar Proponent Standard Heritage Agreement Discuss any departures that ETNTAC has identified - with the aim of getting as close as possible to a final document. Heritage Survey – Balance of Munglinup Project Site Shared understanding by both parties on heritage methodology going forward – priority being the current project development envelope (Mining and General Purpose Leases/Misc. Licences) and possible revision of the Cultural Heritage Management Plan. Procurement of Heritage Consultant based on an agreed scope. Matter for discussion – given MRC preference for a transparent procurement process, with associated contractual specifications What the future holds beyond Heritage Discussion of future commercial and employment opportunities that extend beyond what has primarily been a relationship based on resolving site heritage matters.		Rob Houston to revert with suggested amendments on a without prejudice basis. MRC and ETNTAC to develop methodology by which heritage work will be undertaken for the balance of project tenure not surveyed in 2018. The current Cultural Heritage Management Plan, which is primarily focused on managing the outcomes of the 2018 survey, will be amended to include the agreed heritage methodology going forward, as well as the final clearance of areas for mining development and activities and the installation of permanent Infrastructure. MRC will also provide ETNTAC with a schedule of proposed works related to: • exploration activities planned during 2020 • Proposed clearing for mining activities and infrastructure development leading into the construction phase of the project. MRC to continue to negotiate in good faith with ETNTAC regarding appropriate procurement of a heritage consultant. MRC to consider commercial/employment opportunities and appropriate mechanism through which to agree potential arrangements – possibly in the form of an MoU or exchange of letters.
27-Nov-19	Meeting / Briefing	ETNTAC	1 Esperance Nyungar Proponent Standard Heritage Agreement – work was continuing between MRC and ETNTAC – with proposed revisions submitted by ETNTAC and agreed by MRC. 2 Heritage Survey – Balance of Munglinup Project Site. There needs to be a shared understanding by both parties on heritage methodology going forward – priority being the current project development envelope (Mining and General-Purpose Leases/Misc. Licences) and possible revision of the Cultural Heritage Management Plan. 3 Procurement of Heritage Consultant based on an agreed scope. MRC confirmed agreement for the engagement of AAA based on the scope submitted to and agreed with ETNTAC. 4 MRC advised that it had developed draft terms for possible financial support to be provided to ETNTAC to assist with heritage work, and development of commercial and employment opportunities. Other: Nil	1 ETNTAC was comfortable with the progress and approach being taken by MRC – especially as regards to revision of Clause 18. 2 ETNTAC comfortable with revision of the CHMP to include survey methodology. Acknowledged receipt of mapping information and shape files for the project from MRC. 3 ETNTAC advised that it had engaged AAA through a similar contracting arrangement to previous occasions. 4 ETNTAC advised that it was pleased that MRC were looking at providing support, and that from their perspective financial support would be better in the form of a funding agreement – rather than providing support for a specified position. They believed it would be too difficult to secure a position that would extend across heritage, commercial and employment matters. Other: Nil	1 Negotiations to continue between the parties with a target date of execution of the agreement being February 20220. 2 MRC to draft proposed revisions to the CHMP and submit to ETNTAC for consideration – with a target date aligned with the Heritage Agreement, as they are complimentary documents. 3 MRC to continue to negotiate in good faith with ETNTAC regarding appropriate procurement of a heritage consultant for future work. 4 MRC undertook to consider ETNTAC feedback and look to draft terms for consideration by ETNTAC in line with the Heritage Agreement and CHMP. Other: Nil

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20-Feb-20	Meeting / Briefing	Ravensthorpe Community Landowners Community Members Key Stakeholders Local Government Industry Groups	The community briefing was attended by 10 people, plus the CEO & President of Ravensthorpe Shire, the briefing provided an overview of the upcoming events, process and information on the construction and running of the mine. 1. Update on proposal aspects – processing methodology, mine life, vehicle access routes, environmental and heritage process, timeline of project. 2. Community engagement.	Feedback/Concerns raised included: 1. Waste Landform design 2. impact on the river 3. Financial benefits of the mine 4. impact on threatened and priority species 5. Dieback Management 6. Major flood events 7. Hydrogeological recharge of the river 8. Groundwater dependant ecosystems 9. TSF design 10. Housing for Employees	Response provided to Feedback/Concerns: 1. Small waste rock landforms will be constructed. Integrated Waste Landform not suitable for area. 2. Low impact on the river 3. Estimated price of graphite 4. Species Groups identified; mining impact expected to be minimal. TEC is avoided, apart from the access roads. 5. Working on a dieback management plan 6. Project sits outside 1:100 year event flood levels. Surface waters work underway on 1:300/500 flood level events. 7. Interaction between groundwater and river believed to be minimal 8. Vegetation groups do not go deep enough to tap into the aquifer 9. TSF will be monitored all around, TSF to be lined 10. Will not be building permanent houses or camps
20-Feb-20	Meeting / Briefing	Munglinup Community Landowners Community Members Key Stakeholders Local Government Industry Groups	The community briefing was attended by 14 people, the briefing provided an overview of the upcoming events, process and information on the construction and running of the mine 1. Update on proposal aspects – processing methodology, mine life, vehicle access routes, environmental and heritage process, timeline of project. 2. Community engagement.	Feedback/Concerns raised included: 1. Road design and use 2. life of mine 3. mining methods 4. TSF design and use 5. Air quality concerns 6. Draw on community	Responses provided to Feedback/Concerns: 1. Will upgrade a gravel road 2. 15 year mine life 3. Mining Methods include open pits, no drill or blast, hydrocarbons (diesel or kerosene) 4. TSF contained and lined, monitoring for hydrocarbons in the water 5. Dust suppression will be main concern 6. Draw on community emergency response low - will have an ambulance on site, Water carts can be used for fire management.
20-Feb-20	Meeting / Briefing	Sire of Ravensthorpe	General discussion was had updating the project and discussing what the Ravensthorpe community meeting had discussed, and the potential questions from the Munglinup community	Shire advised the road was suitable for vehicle traffic up to semi-trailer.	N/A
21-Feb-20	Meeting / Briefing	Shire of Esperance	General discussion around the project and working with local environmental and heritage groups	The Shire requested additional information regarding the miscellaneous licence (now surrendered) including size, annual tonnage.	
21-Feb-20	Meeting / Briefing	Esperance LEAF Community group	This meeting was attended by 5 members from the Local Environmental Action Forum (LEAF). A brief introduction was given from LEAF to their organisation and history, and what they do for the area. The briefing then provided an overview of the upcoming events, process and information on the construction and running of the mine.		Responses provided to Feedback/Concerns: 1. Graphite is used for Li Ion batteries, graphite foils, lubricants, graphene 2. Transported to world market 3. Graphite transported in sealed bulka bags on a truck. Graphite is inert. 4. No new sightings of Quenda 5. Periodic monitoring of the munglinup river 6. Any surplus water will be run through sediment traps and tested before release into the river 7. Groundwater is sea quality. Not drawing water from or close to the river. 8. Onsite diesel plant 9. Stockpiled on a ROM pad outside

Date	Type of Engagement	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback	Response to Feedback / Outcomes / Comments
21-Feb-20	Meeting / Briefing	Esperance Community Land owners Community Members Key Stakeholders Local Government Industry Groups	The community briefing was attended by 20 people, the briefing provided an overview of the upcoming events, process and information on the construction and running of the mine 1. Update on proposal aspects – processing methodology, mine life, vehicle access routes, environmental and heritage process, timeline of project. 2. Community engagement.	Feedback/Concerns raised included: 1. Waste Landform design 2. Life of Mine 3. Final rehabbed form 4. Recovery process of graphite 5. Trucking to Fremantle rather than Esperance 6. Fire mitigation process 7. Likelihood of mine proceeding	Responses provided to Feedback/Concerns: 1. Small dumps with concave slopes 2. 15 year mine life 3. Pits will be left as pits, Vegetation re-established on waste dumps and TSF. 4. Floatation Recovery Process 5. Reason being the cost of shipping from Esperance 3 times higher than Fremantle 6. Will re-establish fire-break, been in contact with Munglinup fire department, may look at reduction burns. 7. High level of confidence that mine will proceed, biggest factor is the environmental approvals
5-Jun-2020	Email	DAWE	Environmental assessment officer handover from Jena Harp to Bronwyn and Aiden Walsh as the DWER Officer on the refferal Project. Request for update on additional information report.	N/A	N/
02-Jul-20	Email	DAWE DWER	ISPL advising DWER and DAWE of potential date of refferal submission. Querying on how to submit WA IBSA Data Packages and document sizes	Aiden Walsh resonded with guidance on how to submit WA IBSA data packages through the Portal.	N/A
17-Aug-20	Email	DWER	DWER Licencing and Allocation Officer reviewing licencing under the RIWI Act. Request for Spatial data for clarification	Shapefiles sent to Julie Pech on 20/8/2020	N/A
4 -Sep-20	Email	DWER DAWE EPA Services	Supporting Information Document, key matters for revision to meet EPA services requirements: • Flora and Vegetation: - Additional discussion and mitigation of the potential impacts to the three potentially novel taxa found in the project area - Further discussion and mitigation of the potential consequences of the introduction of Phytophthora dieback on flora and vegetation • Inland Waters: - Please provide additional information to support the proposed water supply for the mine - Please provide further discussion on the ecological values associated with the Munglinup River • Terrestrial Fauna: - Further information is required on the habitat for Malleefowl, Redtail Phascogale, Short Ranged Endemics and Chuditch, such as additional survey reports or appropriate justification for the level of survey effort undertaken.	29 detailed comments were formed from the Government agencies reviewing the proposal. Each of these points advised of actions to be taken to be able to addressed. Supplementary report document to be updated by ISPL with addition information required from baseline providers and MRCG Meeting with MRCG and Government departments arranged to clarify requirements."	Supplementary information document updated for resubmission to meet all requirements and feedback received in DMA document.

Date	Type of Engagement	Stakeholder Organisation	Matters Discussed	Stakeholder Feedback	Response to Feedback / Outcomes / Comments
			- Please provide a consideration of the offsets required for impacts to listed conservation significant fauna species found within the development envelope"		
24-Sep-20	Meeting / Briefing	EPA Services DAWE	Offsets of Chuditch and Malleefowl CBA/Economic benefit information	Offsets are required for TEC, Chuditch and Malleefowl Clarification of what is required for Economic Benefit information required for submission	Updating supplementary information document to reflect stakeholder feedback.
15-Feb-2021	Email	DWER DAWE	• Feedback from the Additional information report received via email. • Novel Flora Species (DWER) - Additional discussion and mitigation of the potential impacts to the three potentially novel taxa found in the project area - Further discussion and mitigation of the potential consequences of the introduction of Phytophthora dieback on the novel flora species • Offsets (DAWE) • Revised Offset calculator to include offsets for the Ecological Corridors • Compiled a memo explaining the approach, values adopted for the Offset calculator, • Revise Offset calculator to include direct and indirect hectares (9.16ha of possible breeding, 310ha pf possible foraging and the 5% or 16ha of indirect impacts) of impact for Malleefowl – DAWE believe MRC must offset 336ha of Malleefowl habitat	Meetings set up with both DAWE and DWER for further clarification	
22-Feb-2021	Meeting	DWER	• Novel Flora Species - - Additional discussion and mitigation of the potential impacts to the three potentially novel taxa found in the project area - - Further discussion and mitigation of the potential consequences of the introduction of Phytophthora dieback on the novel flora species		Document has been updated to address the concerns and actions provided by DWER.
24-Feb-2021	Meeting	DAWE	• Offsets (DAWE) • Revised Offset calculator to include offsets for the Ecological Corridors • Compiled a memo explaining the approach, values adopted for the Offset calculator, • Revise Offset calculator to include direct and indirect hectares (9.16ha of possible breeding, 310ha pf possible foraging and the 5% or 16ha of indirect impacts) of impact for Malleefowl – DAWE believe MRC must offset 336ha of Malleefowl habitat	• Documentation provided to MRC to assist with values and inputs into the offset calculator. • Additional detail on selection process for risk of lost estimates, time until ecological benefit and confidence in results and detail in the weight ranking rationale.	

APPENDIX C: BASELINE SURVEYS

APPENDIX C-1: Rockwater (2020) Hydrological Review

APPENDIX C-2: Rockwater (2020) Stage 3 Hydrogeological Assessment

APPENDIX C-3: Woodman Environmental (2020) Detailed Flora and Vegetation Assessment

APPENDIX C-4: Woodman Environmental (2020) Flora and Vegetation Impact Assessment Memo

APPENDIX C-5: Glevan Consulting (2018) Phytophthora Dieback Occurance Assessment

APPENDIX C-6: Great Southern Bio Logic (2020) Phytophthora Dieback Occurrence Survey

APPENDIX C-7: Western Ecological (2020) Level 2 Fauna Survey

APPENDIX C-8: Western Ecological (2020) Vertebrate Impact Assessment Memo

APPENDIX C-9: McQuoid Ecology / Ecotones & Associates (2020) Ecological Linkages/Biodiversity Corridors Impact Assessment

APPENDIX C-10: Invertebrate Solutions (2020) Survey for SRE Fauna

APPENDIX C-11: Invertebrate Solutions (2020) SRE Impact Assessment Memo

APPENDIX C-12: Water Research & Management (2018) Baseline Water Quality & Aquatic Fauna Survey

APPENDIX C-13: Herring-Storer Acoustics (2019) Desktop Noise Assessment

APPENDIX C-14: IBSA Data Submission Evidence

APPENDIX C-1: Rockwater (2020) Hydrological Review

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APPENDIX C-14: IBSA Data Submission Evidence

APPENDIX C-15: AEMCO (2020) Munglinup Graphite Project – Key Economic assessment information

APPENDIX D: Flora and Vegetation Management Plan

APPENDIX E: Dieback Management Plan

APPENDIX F: Terrestrial Fauna Management Plan

APPENDIX G: Inland Waters Management Plan

APPENDIX H: Company Policies

APPENDIX I: MNES Offset Supporting Document